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International Health Exhibition,

LONDON, 1884.

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VOLUME IX.

HEALTH IN RELATION TO CIVIC LIFE.

LECTURES.

ANGLO-SAXON DRESS AND FOOD.

VILLAGE HEALTH AND VILLAGE LIFE. RECREATION.

AMBULANCE ORGANISATION IN WAR AND PEACE.

PREVENTION OF CHOLERA.

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CHILDREN THREATENED WITH CHRONIC DISEASE.

ETHICS OF THE SKIN. OUR DOMESTIC POISONS.

THRIFT IN ITS RELATION TO HEALTH; OR, THE RIGHT USE
OF REFUSE.

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ANGLO-SAXON DRESS AND FOOD.

BY

PROFESSOR HODGETTS.

VOL. IX.—H L

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. JUNE 27TH, 1884.

A LECTURE ON ANGLO-SAXON DRESS AND FOOD.

By PROFESSOR HODGETTS.

THE Chair was taken by T. Morgan, Esq., F.S.A., Vice-President and Treasurer of the British Archæological Association, who, in introducing the lecturer, said his name was already well known in scientific circles in this country for his great knowledge of the Northern languages.

LECTURE.

IN contemplating any question of social or historical bearing we are generally, from the absurd bias of our monkish education, diverted from our own race and nation to trace the origin of all that is good and great in us to influences, not only foreign as to blood, speech and thought, but actually most inimical to ourselves and our true progress, as a nation. Whenever the history of our race is attempted, the true ancestors from whom we derive everything in us which is specifically English are shuffled off the stage anyhow, so that we really get rid of them. "Oh, those tiresome Anglo-Saxons!" is the ordinary cry, "Thank God, we have done with them, and can now begin the History of England!" The history of England therefore begins, according to most authorities, with the tyranny of a foreign adventurer, who is called the first king of England, and we who are English are more conquered than our forefathers

were, in that we reckon our kings according to his dictum and not according to the truth. One great and glowing writer on the history of our land begins it with another foreigner—another William, too—more than six hundred years after the Norman yoke had pressed so heavily on English necks. Truly, the advent of the third William was part of English History, but the advent of the first has been unduly dwelt on, having been in fact only negative history for us. It teaches us that we never became Normans, we never learnt French, and we cannot speak it now any more than in the time of Chaucer. The few hundred Normans, self-styled rulers of the land, never really affected us, although there were snobs in the eleventh century who copied those in power. But Norman-French died out, like any other slang, and never really affected either our language or our mode of thought. The Latin words which mar the beauty of our modern speech have nearly all been introduced since the Reformation. The Norman words are such as have no actual bearing on our life save some few names for viands for the table, stupid legal technicalities and some church terms.

The great master of the New Science of Language, Professor Max Müller, of Oxford, has pointed out that language, as such, cannot be mixed. Words may be added from a foreign source, but that only affects the vocabulary, not the heart and soul of any tongue. We came from Scandinavia in the fifth century. We never mixed with those whom we cut down, but lived with them in constant warfare. According to the Scandinavian law we brought our wives and priestesses to Britain, and by that very law all inter-marriage with the Christian Kelt was looked upon with horror. So we remained pure English pagans, until Rome sent missionaries to convert us to the faith. The Britons, as their own historian Gildas informs us, never sought to bring the truths of Christianity under the notice of the English. They could not have done so. Fancy an English general of to-day taking a lesson in the faith from a Maori chief!—and the same stubborn pride that reigns in us now

was that which won this island from the Kelts, fourteen hundred years ago.

When Rome sent missionaries to these shores, Augustine had such dread of English Pagan force that he turned back again, and it required all the Papal skill to talk him into trying us again. He came, and we were the first converts Rome ever made by love. We never bowed before her sword, we were never conquered by Rome. We, of the Gothic blood, had crushed her in the dust. We took her Christianity, not *her*. And, in the very early homilies preached in the English Church, we took our English view often opposed to Rome. Then came the monasteries with their monks, who wrote for other monks in Latin, but left our English pure. We took some tinsel from the Latin source, some tawdry gilded playthings from the French, and hung them on our sturdy English speech, as children make a Christmas-tree out of a Scandinavian pine by hanging glittering trumpery on the boughs. The gauds fall off and wither, the tree is evergreen. So our English speech, true, straight, and firm, a plant of Norman growth, bears some tinsel rubbish, which decaying, leaves the pine unharmed and pointing to the skies for ever !

Thus language and our Early history combined should teach us, when a question rises concerning English thought and English modes of life, the utter folly of the Latin school that points to an excrescence, not the thing itself.

The greater number of those institutions of which we are so proud—freedom of speech, the parliament, the three estates of the realm, the trial by Jury, the freedom of the subject, our noble language, and chivalry that really *honours* woman—all these, I say, are branches of the Scandinavian pine that represents our race. Our customs and our thoughts are very different things from those which Roman dissipation, or the more revolting sensuality of Greece taught in those vicious schools to which, by some infatuation, we strive to bring our youth.

It is common when an antiquary would show his learning on, no matter what, to say "the Romans had a thing like

this"—or "a custom not unlike that was observed in Rome"—then he feels "all right." He shows his learning and the class applauds, no matter how the view of history may have to be distorted. He lands us safe in Rome, and all is history and very interesting. I want you all who are true Englishmen (and how much truer English women) to shake this folly off. However we may now admire the Roman race, we are not of it. The Romans never were our ancestors and are nothing to us; nor are the Normans any nearer for having tried to stamp us out and crush us.

So, when I profess to tell you something of the early customs of our race you will hear something very unfamiliar, *ex cathedra*, but yet as known to you as "household words," within your inner life.

Our early home was Scandinavia, and there we must search out the root of that same pine of which I spoke. We are from the South of Scandinavia proper, so that we lie between the Scandinavians, so-called, and the more known Teutones. Therefore, although we find the roots of all our words and works pure Scandinavian, some branches are more German than would have been the case had we lived farther North. But this explains why some words living in our tongue to-day are found in German, not in Scandinavian speech. Some of our words have died away with us, or rather just lie dormant, and live in German. Others have lost the sense they used to have, but most live on among us.

Of course, in tracing the history of any early people we have to bear in mind the result of climate, and of religious views in bringing certain results about. All the Northern part of the European continent was once called Germany, including Scandinavia, Germany, and a portion of France. The Northern tribes who lived in Scandinavia had to contend with cold, with hunger, and with such savage beasts as wolves, and bears, and bisons. Cold means invention, arts of life, and science. Clothing and houses must be warm. Food must be such as serves the frame for fuel. So I shall take you home with me into the far

back past, into an older England, and show you what we did before we came to Britain, and why some of the self-same things are done by us to day.

When the great tide of life rolled westward it swept before it all the other races in its path. The Finns retreated like the Lapps and Kymri to hills, and rocks and plains, and later, but in the same kind of way, the Kelts and Kymri vanished. The conqueror was stronger, hardier, bolder, and much more inventive than the races he subdued. He faced the Orochs, slew him for his hide, his flesh and horns. He tamed the wild horse of the Tartar plains and brought him into Europe. He slew the wolf and grizzly bear, hunted the vicious boar for food and tusks, and not contented with this hunter's life he ploughed the sterile plains and raised his corn for bread ; sheep lent their wool, the flax was spun, and various dyes were used to tinge the linen of our ancestors more than two thousand years ago in Southern Scandinavia.

The first requirement of man is food. This places him at once at war with nature, and art is his ally. To meet the buffalo, the bear, or boar, man must have other arms than those supplied by nature. Accordingly we find broad weapons made of steel to help him in the conquest of the herds whose flesh shall yield him food. And in the bleak cold North we find the boar's flesh more to man's taste than that of bull or bear, because it is fatter, richer, and produces much more heat. For this very reason in the South and East the flesh of swine is an abomination. Closely connected with the food he eats are sacrifices which man makes to gods. Referring to the Hymns, which form the Edda, we find a boar slain each night to yield the warriors food who feast in high Valhalla. The bones are all preserved, so is the hide and head, and in the morning they are put together and re-endowed with life. The name of this huge pig is Sæhrimner, the cauldron in which it is boiled is Eldhrimner, and the cook is Andhrimner. Thus we find, in so early a hymn as this, allusion made to the boiling of boar's flesh by our Pagan ancestors. The

drink of the warriors in Valhalla is mead drawn from a certain goat, this drink is of such strength as an intoxicant, that none but very stalwart warriors can stand it. It is poured out to the heroes by lovely maidens stationed behind the seats of the warriors, "Like morning stars of glory, behind the thunder clouds." The warriors drink the mead out of the horns of the Orochs, which they empty at each draught to Odin and the other deities. Mead is a fermented liquor based on honey, and is still used in Russia where it is called *meod*, which is also the name for honey. The custom of drinking mead is purely Scandinavian, and was introduced into Russia, with many other Scandinavian customs, in the ninth century by Ruric. The warriors were supplied with beautifully made stoups or buckets of linden wood bound round with gold or bronze. Into these buckets the soup was poured by the servitors at the tables of the great, while the maidens of the household filled the horns with mead. The firmer pieces of meat in the bucket of soup were taken out by means of a spoon, the very form of which has come down to the peasants in Russia at this very day. But in the middle of the bowl there were five holes in the Scandinavian spoon through which the liquid ran leaving the solid meat dry, which could be eaten without endangering the integrity of the much-prized beard—to keep which in order the champion carried with him in his pouch a most dainty pocket comb; and this with the horn, and spoon and stoup were buried with him when he died; and such are constantly found in Anglo-Saxon tumuli in England. There are specimens of all these things now in the British Museum.

The refinement of the perforated spoon shows our remote ancestors to very great advantage. It points to the curious fact that soup was as indispensable to them as now to modern Scandinavians and Germans. After the meat was taken out the soup was drunk on Jacob Faithful's plan. Our fathers came to Britain as we have gone to New Zealand and America, and they brought their civilisation with them—how could they have left it behind? They

were besides not so humble as we are, who, of course, are not conceited, and never think *our* way's the best! So when they saw what Roman art had done in Britain, judging by their own standard they cut it down! And we have reason to be thankful that they did! They understood the Kelt better than we do, or at least they saw that there was no peace to be made with him, and resolute, determined as they were, they cut him down too! They were bold warriors and despised both Kelts and Kymri, as underhand assassins, so they cut them down. They never took a Roman or a Keltic word, they adopted no customs from the weakly races that could not hold their own!

No nation is so rich as we in stories of the past. Back to the early home in that peninsular which calls herself the Nurse of Heroes our tales and Sagas lead us. And when the taste for writing first set in during the ninth century, Sagas were noted down of very high antiquity, Sagas that had been current tales two thousand years before. When the scribe wrote, besides the words he penned he loved to deck the page with dainty ornament. Warriors were drawn and ladies richly clad; kings, earls, and peasants, all were featly drawn and painted with such colours as could show the men and women of those times just as they dressed and lived. And among these rich treasures of our most noble past we find the very instruments they buried in their tombs; that is to say such instruments as we should think to find; of course we find no cauldron. But in the MSS. the cauldron stands over the fire in the middle of the hall, and there the boar is sodden. Nor is this all. Other ingredients make the soup more attractive—birds of various kinds, rabbits, game, venison, etc., combine to form a stew as appetising as nutritious. Then were various portions of the ox, the elk, the smaller deer, the goat, served round on spits from which the warriors carved such pieces as they fancied with their seaxes. Then came the birds of various kinds all roasted at the same grand fire in the centre of the hall.

In Scandinavian homes of the fourth century such halls

as these were common, and such a hall is drawn for us in our own Epic Beowulf, and I shall touch upon it more at large when speaking of the buildings of our sires in the brave days of old. At present we must confine ourselves to what is on the table.

In early representations of the meal we find a knife a spoon and *plate* laid on the board for every hero, and each man had his seat duly marked by his group of weapons hung behind, consisting of his *gár* or war spear, crossing the spear or *spjut*, used more in hunting and in taking walks or riding out in peace than in war. There hung the fearful battle-blade, the Hring Mæl of the poets for cleaving rings in twain; there hung the byrnie or linked shirt of rings, worn over the war tunic; there hung the shield formed of the linden wood covered with the skin of the bull, or bear or wolf, which skin was kept in its place by a metal band sometimes of gold, but oftener of bronze: such was the group that marked the champion's place in halls in Older England, in our pagan days.

The centre portion of the eastern wall was furnished with a platform or a dais, on which the king or yarl, who entertained these Thanes and other champions, sat with his queen or Hlæfdige, and joyed to see them feed! She had a basket filled with loaves like dinner rolls, and this was sent round for distribution to the train. There were larger loaves and other things made by the baker's art. From this custom our modern titles lord and lady are derived, lord being the corrupt form of Hláford, which means origin or cause of bread, as in modern German Brod-Herr means the lord or superior from whom a man gets his living. Lady is the equally corrupt form of Hlæfdige or bread distributor. The word Hláf is full of philological interest for us. We find it in the Gothic Hlaibs, the German Leib-brod, and the Russian Chlaib. It is one of the dear old words which are part and parcel of our nature, never to be dislodged by *panis*, so deeply impressed upon us were the feelings prompting these customs and so thoroughly English were they that Christianity could not efface the words lord and

lady, and they were applied to the Saviour of mankind and the Virgin Mary respectively.

In the centre of the great hall stood the hearth (another word that shall never be banished as long as English is spoken), and the radiant heat was felt all round ; the smoke in the older Scandinavian houses soared upwards to a hole in the roof through which it escaped, blackening the rafters near the aperture in its passage. Hence arose the saying among the Vikings, "to drink beneath a sooted roof." Such a roof was the cover of the Anglo-Saxon houses in England at the beginning of the sixth century, and from such blackened rafters hung the cauldron for the soup, while on four sides of the fire the spits just referred to were arranged.

Besides the means of roasting and broiling, boiling and stewing, the Early English had baked meat, smoked meat, smoked fish, beaten meat, beaten fish, meat chopped fine and mixed with herbs, sausages, balls of minced meat—like the forced-meat balls of our time—and bacon. Marrow puddings, and later on oyster patties, and besides the large and small loaves, the vocabulary of Archbishop Ælfric notices the *gehafen hláf*, or fermented bread ; *Theorff*, unleavened bread ; *ceorlisc hláf*, peasants' bread ; *hwocten hláf*, wheaten bread ; *heorth-bacen láf*, hearth-baked bread ; *ofen bacen hláf*, bread baked in the oven ; *gehryst láf*, toast.

They had cheese, butter, and a preparation something like cream-cheese called *gerynn* ; it exists in Russia at the present day under the name *tverok*, but we have lost it. They had a kind of food called *bri* or *brí*, which seems to have been the prototype of the Scotch porridge. From very early times the use of the table-cloth appears to have been general amongst us.

The question of drink was solved by our ancestors in a variety of ways. They imported wine largely, even in the earliest times. At first, as Tacitus says, from the Rhine. Subsequently, especially after the conversion to Christianity, a kind of wine was imported from Italy. In

Ælfric's glossary we find Falernum translated by *thæt seleste wīn*, i.e., the best of all wines. Beer and mead were the chief drinks, but for the higher chieftains wine was considered the appropriate beverage. And there is an exalted refinement in ascribing to Woden the absence of the grosser appetite for food. Wine was his sole nourishment, and this is the more remarkable when we reflect that he was the God of Wisdom, and that wine is representative of a higher form of wisdom than water, which is only the symbol of natural or external truth. In Ælfric's colloquies we are told that wine is not good for very young people, and as this is illustrative of my subject I shall give you the conversation in modern English. A boy is asked what he eats? and the reply is: "As yet I feed on flesh-meat, because I am a child living under the rod." "What more dost thou eat?" "Herbs, eggs, fish, cheese, butter and beans, and all clean things I eat with many thanks." Then comes the question: "What dost thou drink?" "Beer if I have any, or water if I have none." "Thou drinkest never wine?" "No, I am not so rich as to be able to buy wine for myself, besides, wine is not the drink of children and fools, but of elders and wise men."

The learned editor of the Leech Book says:—"Salt, which is an indispensable condiment to civilised man, they obtained from Cheshire and Worcestershire, where they had furnaces for the evaporation of the brine. Salt for salted meats, which also were quite familiar to them, might be got from the salt pans on the sea-shore."

The same writer gives a list of the kinds of food partaken of by our fathers, which I think so interesting that I may be justified in calling special attention to it. He says:—

"At his noon meat or dinner, at the *hora nona* or ninth hour of the day, for the word noon has now changed its sense, the Saxon spread his table duly and suitably with a table-cloth. He could place on it for the entertainment of his family and household the flesh of neat cattle, now Normanized, as Sir Walter Scott has made familiar to all,

into beef, the flesh of sheep now called mutton, of pig, of goat, of calf, of deer, especially the noble hart, of wild boar, the peacock, swan, duck, culver or pigeon, waterfowl, barn-door fowl, geese and a great variety of wild fowl, which the fowler caught with net, noose, birdlime, birdcalls, hawks and traps; salmon, eels, hake, pilchards, eelpouts (young eels), trout, lampreys, herrings, sturgeon, oysters, crabs, periwinkles, plaice, lobsters, sprats, and so on."

"The cookery of these viands was entrusted to professors of that admired art, who could, though their accomplishments have been neglected by the annalists, put on the board oyster patties and fowls stuffed with bread, and such herbs as parsley. Weaker stomachs could have light food, chickens, giblets, pig's trotters, eggs, broth, various preparations of milk, some of the nature of junkets. All food that required it was sweetened with honey before men had betaken themselves to sugar. For fruits, we know that they had sweet apples, which are not indigenous to England, pears, peaches, medlars, plums, and cherries."

"Saxons, thus well provided with eatables, could satisfy thirst with not a few good and savoury drinks; with beer, with strong beer, with ale, with strong ale, with clear ale, and with what they called *twy brawen*, that is double-brewed ale, a luxury now rare, and rare too then probably. They drank also mead, an exhilarating beverage of an antiquity far anterior to written or legendary history. They had also great store of wines which they distinguished by their qualities, as clear, austere, sweet, rather than by their provinces or birth. They made up also artificial drinks, Oxymel, hydromel, mulled wines, and a clear drink or claret of the nature of those beverages which we now call cup."*

The most exhaustive writer on Anglo-Saxon civilisation was the late Sharon Turner, whose History of the Anglo-Saxons has never been approached for excellence, profound

* Leechdoms, Wortcunning and Starcraft of Early England, Rev. Oswald Cockayne, 3 vols., Royal 8vo, London, 1865. Vol. II., preface, p. xi.

research, and accurate knowledge of his subject. And in this imperfect effort of mine to present you with a view of certain parts of that civilisation which are specially connected with our lecture to-day, I shall not scruple to give you a quotation from certainly the most reliable of the writers on the manners and customs of the Early English. He says, when speaking of their food, "They had oxen, sheep, and great abundance of swine ; they used, likewise, fowls, deer, goats, and hares ; but though the horned cattle are not infrequently mentioned in their grants and wills, and were often the subjects of exchange, yet the animals most numerous stated are the swine. The country in all parts abounded with wood ; and woods are not often particularised without some notice of the swine which they contained, or were capable of maintaining. They also frequently appear in wills. Thus Alfred, a nobleman, gives to his relations an hide of land with one hundred swine ; and he directs one hundred swine to be given for his soul to one minster ; and to his two daughters he gives two thousand swine. So Elfhelm gives land to St. Peter's at Westminster, on the express condition that they feed two hundred of these animals for his wife."

"They ate various kinds of fish ; but of this description of their animal food, the species which is most profusely noticed is the eel. They used eels as abundantly as swine. Two grants are mentioned, each yielding one thousand eels, and by another two thousand were received as an annual rent. Four thousand eels were a yearly present from the monks of Ramsay to those of Peterborough. We read of two places purchased for twenty-one pounds, wherein sixteen thousand of these fish were caught every year ; and in one charta, twenty fishermen are noticed, who furnished during the same period, sixty thousand eels to the monastery. Eel dikes are often mentioned in the boundaries of their lands."*

I have before mentioned the conversations constructed.

* Sharon Turner, *History of the Anglo-Saxons*, Vol. III., Book VII. Chap. III.

by Ælfric to teach Latin to the youth of his time. They are most curious as affording a proof of the advanced state of our forefathers as teachers. The colloquies are in Latin, with an Anglo-Saxon interlineary translation on the Ollendorff system, which they further resemble in the circumstance of being arranged as conversations on familiar topics. Thorpe, the eminent Anglo-Saxon scholar, has shown that the gloss was only intended as a key for the master's use and not for boys, like the arithmetic books which used to be published with keys in aid of the teacher. For whomsoever it might have been intended, the system was there, and it was the same system that has recently been revived as a means for teaching modern languages. These colloquies introduce us to the various arts and trades of our ancestors, and while on the subject of fish, I cannot do better than introduce you to the fisherman. I quote from the edition given by Thorpe in his *Analecta Anglo-Saxonica*. The first question put to the Piscator is : "What craft knowest thou? A. I am a fisher. Q. What dost thou get by thy craft? A. Big loaves, clothing, and money. Q. How dost thou take fish? A. I ascend my ship and cast my net into the river, I also throw in a hook and bait, and what that catches I gain. Q. Suppose the fishes are unclean? A. I throw the unclean away, and take the clean for food. Q. Where dost thou sell thy fish? A. In the city. Q. Who buys them? A. The citizens; I cannot take so many as I can sell. Q. What fishes dost thou take? A. Eels, haddocks, minnows, and eel-pouts, skate and lampreys, and whatever swims in the river. Q. Why dost thou not fish in the sea? A. Sometimes I do, but rarely, because a great ship is necessary there. Q. What dost thou take in the sea? A. Herrings and salmons, porpoises, sturgeons, oysters, and crabs, mussels, winkles, cockles, flounders, plaice, lobsters, and such like. Q. Canst thou take a whale? A. No, it is dangerous to take a whale; it is safer for me to go to the river with my ship than to go with many ships to hunt whales. Q. Why? A. Because it is more pleasant to me to take fish which I can kill with

one blow. Q. Yet many take whales without danger, and then they get a great price. A. But I dare not, from the fearfulness of my mind."

In the pagan days of our race, horse-flesh was considered a delicacy, but its consumption went out with the introduction of Christianity. The Penitientiale says: "Horse-flesh is not prohibited, though many families will not buy it." But in the council held in 785 in Northumbria, before Alfwold, and in Mercia, before Offa, it was discountenanced: "Many among you eat horses, which is not done by the Christians in the East. Avoid this."

General as the practice of consuming animal food was amongst us, it seems to have been an expensive article, and more used by the wealthy classes and their retainers than by the poor, as is the case at the present day.

That it was beyond the reach of some is clear from an instance quoted by Sharon Turner, of a king and a queen visiting a monastery, and enquiring, when they saw the boys eating only bread, "whether they were allowed nothing else?" The answer was, that the scanty means of the society could afford no better. The queen then petitioned the king to enable them to provide additional food.

Warm bread was in very general use. We have all heard of Alfred's neglecting to turn the cakes or loaves at the right time. In the life of St. Neot, we are told that "the peasant's wife placed on her oven the loaves which some call *loudas*," a word which I cannot find in the vocabularies anywhere. In the agreement of one of their social gilds, a broad loaf well besewon and well gesyffed is noticed. In one grant of land we find six hundred loaves reserved as a rent. Very often cheeses are reserved in the same way.

Their fasts do not seem so rigorous as those of the Russian church, for they were allowed to use milk, cheese and eggs on their fast days. Of course there were not wanting instances of special severity of mortification. In 735 a lady is mentioned who mortified herself by lying on the bare ground, and subsisting on broth made of the

poorest herbs, and on a small quantity of barley bread. In the same century, Boniface, the Anglo-Saxon missionary, complained of some priests, that they did not eat of the meats which God had given, and that others fed on milk and honey, rejecting animal food.

But abstinence was not the prevalent failing of the Anglo-Saxon monks; nor did they appear to consider mortification so essential to religion as their brethren of the Eastern Church. Friar Tuck, although a portrait of a much later age, is not a bad example of what an Anglo-Saxon monk was in the eighth and ninth centuries. Constant lists of their delicacies appear, among which various dishes made with honey are mentioned by Aldhelm as excelling all the dishes of delicacies and peppered broths.

Salt, as we have seen, was an article in great request, and among the charters there are grants of land in which salt-pans are specified as important articles. This is very natural, because to salt their food was the readiest preparation for the long winters, and in the colloquies of Ælfric, to which I have just referred, we find the following mention of the salter. "Q. Salter, what does thy trade profit us? A. Much. None of you can enjoy pleasure in your dinner or supper unless my art be propitious to him. Q. How? A. Which of you can enjoy savoury meats without the smack of salt? Who could sell the contents of his cellar or his storehouses without my craft? Lo! all kinds of butter and all kinds of cheese would perish, unless you used me."

And we meet with some delightful features in the banquets of our Barbarian sires. We have the refining influence of minstrelsy during the meal, we have the excellent custom of cooking carried on so near the table that the meats were served hot, from cauldron, spit or pan. Then, we have the most refining touch of all in the presence of women at the table. First there was the lady of the house on her special seat on the dais or "high bank." Other ladies were there, both as guests and of the household. Nor were they herded together on one side apart from the

champions who adored and revered them. They sat, on some occasions, side by side with their warriors. In the old pagan times when there were ten priestesses for one priest, when the love of woman was the refining hope that led men on to glory, her power was immense. Christianity rather weakened her sway, and had it not been for the tender regard professed for the Virgin Mary in after times, there would have been no exponent of women's function in the Christian Valhalla. All through the Saxon times, however, grand and powerful ladies are represented as giving banquets and receiving kings. Ethelfleda received her kinsman Ethelstan at dinner, and we are informed that the royal providers, knowing that the king had promised her the visit, came the day before to see if every preparation was ready and suitable. Having inspected all, they told her, "You have plenty of everything, provided your mead holds out." The king came with a great number of attendants at the appointed time, and after hearing mass, entered joyfully the dinner apartment; but unfortunately, in the first salutation, their copious draughts exhausted the mead vessels. Dunstan's sagacity had foreseen the event, and provided against it; and though "the cup bearers, as is the custom at royal feasts, were *all the day* serving it up in cut horns and other vessels of various sizes, the liquor was not found to be deficient." This, of course, very much delighted the king and his companions, and Dunstan did not fail to make a miracle of it, by which means he acquired immense credit.

Henry of Huntingdon speaks with much regret of the fashion introduced by the Normans of having only one entertainment a day at court, contrasting it with the custom of one of our own kings who feasted his courtiers daily with four ample banquets. He declares that parsimony produced the direful change, though it was ascribed to dignity many good customs have originated from selfish causes.*

* Hen. Hunt. lib. vi. p. 365.

The same author (Henry of Huntingdon*) gives us a list of Anglo-Saxon drinks, mentioning mead, ale, pigment, morat, and cider. The pigment was a sweet odoriferous liquor, made of honey, wine, and spiceries of various kinds.

The next great requirement for the body, after food, is clothing, and as very little has been done to exhibit to the modern Anglo-Saxon how the Early English men and women dressed, I shall endeavour to lay before you in as concise a form as possible the result of my own reading on this very interesting subject.

Of course, in the matter of dress man hides his diminished head before the queen of taste, and woman certainly reigns supreme in this province, so that by every right the female dress claims to be considered before that of the men. They wore very finely spun linen over which it appears that two garments were worn—the kirtle and the gown—while as a covering for the head there is invariably depicted the wimple, a sort of hood with long ends, which falling down before were wrapped round the neck and breast. The dresses are always very long, covering the feet and forming in fact a kind of short train ; they are very loose ; the sleeves are long and loose ; there is no attempt at the distortion of the body produced by making a waist. The mantle is a constant article of dress, and is frequently very richly ornamented. The almost awful respect for woman which the Scandinavian races possessed, led them in all their representations of her form to have it carefully draped. Even in such a difficult position as that assumed by the daughter of Herodias, who *tumbles* before Herod, and is actually exhibited turning a somersault, there is a female attendant introduced who carefully disposes her drapery so as to preserve the strict decorum which ought to be inseparable from the subject.

Another noteworthy and very praiseworthy circumstance in the history of Early English dress, as contrasted with what has arisen in later times, is the greater simplicity of the female costume when compared with that of men. I have always held, with Thackeray, that we are vainer than

* Hen.Hunt. lib. vi. p. 367.

women, and this idea has been confirmed by my Anglo-Saxon studies. The true Englishwoman was, in the sixth century—as she is now, thirteen hundred years later—modest, proud, and good. The warrior of the pre-Christian times was certainly “loud” in his attire, his bracelets were more elaborate than those of his helpmate and domestic idol woman. The rest of his “get-up” was much more costly than hers. And now, take a life-guards-man’s full-dress uniform, granting the wearer every possible social distinction, besides; give him high rank with the coronet of a marquis in the “Thing” or National Convention, stars with brilliants in the Senate, and crosses of merit on his breast, and put all these matters, not forgetting the cuirass, jack-boots and charger into one scale, and the robes and insignia of the marchioness in the other, it is not difficult to see on which side weight will tell! So in the days of which I speak woman’s dignity gave her the splendour which man was forced to borrow from the workman and the mine. Let us be proud of our English mothers and honour them in their descendants.

Nor did fashion change in stout old English days with that rapidity to which we become accustomed in the Norman times. Normans were not Englishmen, so that my remarks do not apply to them. But in that Older England where we rested, as it were on our march westward, there was a sameness of austere simplicity amongst our women that tells a grand story of their purity of life. The wimple with its many folds, the gunna with its length of skirt, all tend to show how accurate was Tacitus in his high opinion of those Teutonic Scandinavians, whose direct descendants our foremothers were. But this simplicity was not the simplicity of savagery. Women wore ornaments according to their rank, and in the Anglo-Saxon wills we find many gems and ornaments bequeathed, as for example, in the will of Wynflæd, a document of the tenth century, we learn that she bequeaths to Æthelflæd, her daughter, her graven torque, and her mentle-preon or mantle brooch, and the land at Ebbesborne, and other property in perpetuity. Besides these directions she orders that certain of her people be set free. To another person she bequeaths her

two buffalo horns, one horse, and her red tent. Then follow numerous bequests, and ordinances all highly interesting, as illustrating the manners of our race. To Æthelflæd she bequeaths her double lamb's-wool kirtle, and others of linen or linen web; and to Eadgifu two boxes, and therein her best bed, tapestry-curtains, a linen coverlet, and all that belongs—as bed clothes—to a bed; and her best dun tunic, and her better mantle, and her two wooden spotted cups, and her old wire brooch of six mancuses, and one long piece of tapestry for the hall, another short one, and three seat coverings. And she gives to Ceoldryth whichever she likes best of her black tunics, and her best holy veil, and her best binder, and to Æthelflæd her open walking kirtle and cuffs, and binders; and let Æthelflæd afterwards find one of her nun habits, the best she can, for Wulfflæd.*

The whole of this interesting document is most useful as describing the various kirtles worn at the time. Thorpe translates the words, *cinwadenan cyrtel* by *striped* kirtle, I have ventured to refer it to the dresses, with cut or open sides for walking, which are so frequently met with in the MSS.

The dyes in use by the Anglo-Saxons seem to have been very bright and varied. Blue, red, purple, brown, and other colours, besides the monastic black and white were in use everywhere, nor does Christianity appear to have made any very great change in the female costume. The cruciform preon, made of bronze, of silver, or of gold, which is found so largely in the Kentish graves, was an abomination to the Christians, and went out with certain other heathenish ornaments. The large round *spånge*, richly set with gems, succeeded as a brooch, and of this special form there are three or four in the British Museum, where also there are many of the pagan crosses used as brooches.

A favourite ornament was the Heals-beáh or necklace. This in the pagan times was either made entirely of amber beads or else the larger beads in the centre were of amber,

* *Diplomatarium Anglicum ævi Saxonici*. Thorpe, 8vo. London, 1865, p. 533.

which was regarded as a specific against the sweort elf, or evil elf or spirit ; and when Christianity became the faith of the land, the very same charm in the form of beads was used by nuns to guard them from demons. But beside amber, exquisite beads of gorgeously coloured clay were used as ornaments, and so brilliant were the colours of that grand old time, that the remains, of which there are many in the British Museum, appear but a few years, instead of so many centuries old. A very curious relic in the British Museum is the chatelaine, of which there are several specimens. This was attached to the girdle by small chains, and formed a group of very similar articles to those worn by ladies in England thirty years ago. Bracelets were greatly affected by the ladies, but those of the men were heavier and more elaborate. Rings for the fingers were more affected by the ladies than by the men, and both sexes were greatly addicted to broad borders or edgings of gold fringe, beautifully made, as a finish to the dress. Sometimes, instead of fringe, broad leathern bands were worn strongly gilt and well burnished. Occasionally these borders were of gold embroidery, which must have been very effective. The hair, though covered with the wimple, was very carefully tended. It was plaited behind in *tails*, or wound round the head like a coronet ; and one of the most frequent relics in the tombs, is the elaborate pocket-comb in its sheath. The mentel or mantle was susceptible of ornament in being richly edged with gold. There was a small mantle worn for ornament, and the larger garment which was a protection against cold, both were in the winter well lined with fur, for which purpose the furs of the fox, the sable, and the beaver were employed, and even the skins of lambs and cats were used for economy.

Both sexes are represented as wearing delicately made shoes, and even stockings are referred to by Strutt ; when these were not worn, long strips of linen were bound round the foot and leg, much as is done by the Russian peasants at the present day. After this bandage had been applied the shoes were drawn on, though very often shoes were worn next the skin, without bandage or stockings.

The common name for a garment was *hrægel*, an expression applied to clothes in general, as *beado-hrægel*—a war garment, and it was in use as late as the last century, when the expression night-rail for bed-gown was employed. Hand-hrægel meant either a towel or a table-cloth, according to circumstances, and in later Christian times the vestry of a church was called the *Hrægel hús*. But the dear old language was very rich in words containing each due shade of thought, and the vocabularies help us immensely in our researches into the far-back past. They teach us that our ancestors wore gloves, had various kinds of shoes, and, in a word, teach us all about them. From these vocabularies, aided by Scandinavian lights, I will now present to your notice the Early English warrior, both in war and peace, and first in war.

War was the business of our English life when we first came to Britain, but we were not the coarse, illiterate savages that history tries to make us. Rich in poetic myth and half-historic Saga, we brought a refined paganism with us to Britain, which adapted us to become with time the recipients of a very high-toned form of Christianity. We believed in a grand deity, the God of Wisdom, the Father of All and the Disposer of the battle. To him the eagle and raven were sacred, and as servants of All Father, Odin or Woden, the mature tried champion wore in his helmet the wings of the Osprey or great sea-eagle of the North—these were worn one on each side of the helmet, towering aloft and giving him that martial air which struck such terror to the Roman heart.

The helmet was a simple leathern cap around the base of which an iron ring was fixed, to which was fastened two half hoops of the same metal, at the point of intersection of which there was a small ring or knob. The centre-half hoop was elongated in some cases to form a visor to protect the face. This was called the *grim*, and the helmet so provided was known as the *grim-helm*. The Thane wore over his iron band one of gold, the Earl a broader gold band, while the eorlderman wore gold bands over all the

iron work. The kynning, or king, had all the rings covered with gold, and, besides this, small pieces of the precious metal of half-lozenge shape, fixed on the lower band, forming a kind of invected crown ; within was the leathern cap either gilt or coloured with some bright dye, and this seen through the bars—hoops or rings—would explain at once the origin of the modern covered coronet, while the elongation of the grim was the pattern followed by the Normans in their nasal helmet. When guarded by these hoops of iron, the helmet was called the iron helm, when only of stiffened leather, it was called the leather helm. This was worn by the younger warriors who had not attained the Odinic phase in the champion's life. They wore as defensive armour the white shield, the leather helmet, and a *roc* or tunic of leather ; their arms were the hýpe seax, a curved knife or short sword worn at the hip, the gár or spear, and the gavelok or javelin. Where the two hemispherical portions of the leather-helm or hat met, the leather was joined in such a manner that the two edges in meeting formed a serrated crest resembling a cock's comb, and this serrated crest was indeed called the comb—either camb on hættan or camb on helme. From the custom of bearing the camb or comb the Northern warriors were known to the Romans as the kemberi, contracted into cimbrī. From the same word our own "champion" is derived, the *k* becoming *ch* before a broken vowel in Anglo-Saxon as in Swedish. The body was clad in a linen vesture over which came a thicker garment called the pad, and over that was worn the tunic, called by the Teutons, the Scandinavians proper, and by the English a Roc. This Roc was of various colours, chiefly blue fringed with gold. Of course the name for the inner or under garment is the origin of our own expression "to pad." The nether man was encased in linen trousers, sometimes reaching hardly to the knee, sometimes extending to the ankle where they met the daintily finished shoe. The lower leg was encased in a curious trellis-work of interwoven thongs of stout leather, fastened at the point of inter-section by rivets, the heads of which were round

plates of bronze, silver, or even gold. The leather was dyed blue or red, and, being garnished with these golden studs, formed a most dressy leg-guard, and was the model on which the Gaul (who was clever enough to copy whatever he found better than that which he already possessed) based the check stockings worn by the Highlanders at the present day. One of their head-coverings was the *hæt*, much like the modern glengary. The arms and wrists were adorned with bracelets, and the pagan warrior was further known by his cross-like brooch, either of bronze, silver, or gold. The shield was of the light wood of the linden tree, covered over with the skin of some animal. When the warrior was in the state of adolescence, or in the second phase of life called the state of the moon, or Monday, he wore a shield covered with white fur; when he had distinguished himself by daring deeds he was allowed to cover it with darker fur; and when arrived at the Woden period—the Wodensday of their mystic system—he might, if duly distinguished in arms, adopt the distinction of a gold band bound round the shield. This band, however, was not always of gold, the more usual metal being bronze highly polished, which had all the effect of gold. The centre of the shield was formed by a boss of metal across which, on the inside, the handle was fixed by which the whole was carried in the left hand. This form of shield was different to the Roman, as was also the method of holding it. The Romans had bands of metal on the inside of the shield, not unlike the handle of the lid of a modern saucepan, through one of which the arm was thrust while the hand grasped the second. In the English shield everything depended on the grasp of the hand.

But the most important feature in our military dress was the byrnie or coat of mail, made of rings of iron riveted and so interlaced as to form a sort of net-work quite impervious to darts and ordinary arrows. This kind of armour was unknown to the Romans and was greatly superior to the lorica, or in fact any kind of classical armour whatever.

The offensive arms were the Grand Sword, the Hring Mæl, that cut down Kelt and Roman, and won this fair

land for us ; the short sword or seax, the javelin, the gár or spear, the boar spear, the bow and arrow, the sling, the bill, and finally the fearful double-headed bill or battle-axe.

When fully armed for war, either the grand mantle reaching to the feet, or the shorter mantle, coming no lower than the hips, was thrown over the shoulders and clasped with a gigantic brooch. The mantle was of blue, though persons of high rank wore it of crimson profusely embroidered with gold patterns.

The greatest distinction next to the insignia on the helmet appears to have been the *belt*. This was richly adorned with gold and precious stones, and furnished with a clasp of gold elaborately worked. The belt was always worn, and differed in the various classes of society in splendour and meaning.

In many of these particulars we may see the origin of our own ideas at the present time. A belted knight is an expression derived from the Anglo-Saxon distinguishing Baldrick. The crested hero is the combed warrior, the Champion. The modern Earl is the older jarl or eorl, a distinguished warrior ; and curiously enough we may almost see our English forefathers in the dress of the modern Highlander. The trousers were called brók or bróki, as they are now termed in Russia ; the name lives in Northern English as breeks, corrupted into breeches in the south.

The civil costume of the men was like the military habit in form. The rock was a sort of tunic of red or blue, the mantle was worn over it. The belt was worn even in peace, but the trellis-like garment for the lower leg was not always worn. We meet many representations of men in the civil habit whose legs are bare, but the use of the linen trousers, made close to the limb, was general, save in the lower classes, where we often find a tunic doing duty for all those parts of dress which I have noticed. The smock-frock of the modern rustic derives its name from the verb smeogan (to creep through), on account of putting the head through a hole. At least, such is the derivation of the word given by Professor Skeat. Bosworth gives the word

smoc without referring to such an etymology. It does not occur as a German word at all. The early form of shirt is *syrc*, now living in the North English *sark*.

The whole system of our costume was as un-Roman as possible. The *tunica* resembled the *roc*, it is true, but the *roc* was far from being copied from it ; they were descendants from a common parent, but neither was borrowed from the other. And the Scandinavian warrior may boast that his arms were the best, as they enabled him to crush Rome to the dust and found a new Empire in the greater Britain.

When we imagine such a warrior-king with his gold-bound war helmet made into a crown by the addition of the small half-lozenge shaped pieces of gold set up round the rim, with the eagle's pinions of Odin or Wodin branching out on each side ; with the great war-blade in its magnificent scabbard, the hilt adorned with gold, with his gold-bound buckles and fringed war spear, with chain-mail armour flashing back the arrows of the sun, with his scrupulously trimmed beard and haughty bearing—when we imagine our forefather thus prepared for war—we feel that we have something to be proud of as the descendants of a highly civilized being, albeit neither a profligate Roman nor a worthless Greek.

The CHAIRMAN, in moving a vote of thanks to Professor Hodgetts for his most interesting lecture, said it had unfortunately to be shortened for want of time, but he hoped those who had listened to it would pursue farther the course of investigation he had pointed out. He had gone deeply into the customs of the Anglo-Saxons, and had shown that he had warrant for what he had said, and he had no doubt many would be interested in looking up the various objects in the British Museum to which reference had been made.

VILLAGE HEALTH AND VILLAGE LIFE.

BY

SIR HENRY ACLAND, K.C.B., F.R.S.

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A LECTURE ON VILLAGE HEALTH
AND VILLAGE LIFE.

BY SIR HENRY ACLAND, K.C.B., F.R.S.

MR. CHAIRMAN, Ladies and Gentlemen ; in the first place I venture to offer my thanks to all those who have been able to abstract themselves from the din and stir, not only of the vast metropolis, but of this great Exhibition, in order to bring themselves down for a while to the lower levels of our common English life. They who expect from me any learned dissertation, will I trust spare themselves all further labour, and seek some more suitable occupation for the coming hour.

I had no choice as to the subject on which I had undertaken to write some months ago. I was requested to prepare a paper for this Exhibition, on the Health of Villages, and that difficult task I undertook, I confess, with some reluctance. But there is one consideration which I submit to you at once, I think it will weigh with you and receive your sympathy. I have just come from a conference

The present Lecture contains part of the substance of the Handbook of "Health in the Village," and some of its woodcuts. It was spoken to a popular audience, and is printed as furnished to me, with a few alterations, by the Reporters. It was illustrated by careful oral descriptions of drawings and diagrams. These descriptions could not be well repeated here. If any readers are interested by this rude sketch they might obtain the little Handbook.—H. W. A.

conducted by some of the principal architects of England, who have been laying before us the difficult problems of sanitary administration on a vast scale, amid great populations. I, with rashness, am now going to try to interest you in the mere units of our population. I have this excuse. When you come to think over what it is that some of my friends whom I see here, have, this afternoon, been speaking of, it has really been the way to handle multitudes of these units. The right comprehension of the human unit, its wants and its aspirations, appear to me to be the basis of all sanitary work, and a good deal of work besides. If you desire to know what it is that an English family needs, you should consider what kind of person an Englishman is. Whether you go to an artisan's shop here or in the Black country, or into a village, you find at work both good men and bad men. The good men are capable of all education, the bad men, except by a miracle, incapable of any, and therefore incapable of sanitary education among the rest. But you will find a true man, and a true woman earnestly desirous to do their work in life, and if their conditions make it possible, willing and able to do that simple and family work which they respectively have to do. And let me make one more general remark, and that is this—and I made it just now before the eminent persons who lately occupied the room—that I think that plain English people are deeply indebted to those who have endeavoured to make these difficult and almost scientific subjects popular. It is my belief that, in the present condition of civilisation, popular instinct and widespread knowledge amongst the masses and not compulsion will make this work prosper. Therefore when I venture to attempt to say something concerning Village Life and Village Health, it is in the hope that the little I may be able to say may reach the hearts of some of our working people through those present: for I see many here who have devoted their lives to the happiness of the dwellers in villages. Let me now say in what form I am about to endeavour to lay this subject before you. It is one full

of difficulty and complexity, simple as it seems, and I therefore can only offer to give you a picture, and that picture I shall give you in this way. I shall describe to you a village which I know, and have known a great many years. I shall tell you what it was like when I first saw it. I shall then endeavour, if time admits, briefly to state what I believe it ought to be ; and lastly, if you will allow me, I will give a sketch of what has been done in various parts of England to bring this happy condition about. This can only be done in the form of a sketch, which I will now take up with your leave, after my own fashion.

It happened that 25 years ago, being recently made officially a Trustee in a certain rural district, I went into the neighbourhood of the property for which I was supposed to be more or less responsible. I found myself on a hot summer's evening upon a hill looking over one of the fertile plains which we have in the midland counties. As I sat, there was not a sound to be heard. There were a few sheep nibbling about on the stunted and poor grass. There was what you seldom hear in this country, the humming of insects so common in the hot climates of other parts of the world—generally it was one of those tranquil scenes which seem to comprise everything perfect in rural life, and to be just an introduction to that arcadian state of existence of which Goldsmith wrote so much and so beautifully.* Listen to a few of the lovely lines to which I allude, in order to introduce you at once to the description of such a spot. Some of the younger ones, I dare say, may know them by heart, and perhaps all the older ones.

“ Dear lovely bowers of innocence and ease,
 Seats of my youth where every sport would please,
 How often have I loitered o'er thy green,
 Where humble happiness endeared each scene !
 How often have I paused on every charm,
 The sheltered cot, the cultivated farm ;

* This description will be found in nearly the same words, but in more detail in the Handbook above referred to.

The never failing brook, the busy mill,
The decent church that topt the neighbouring hill,
The hawthorn bush, with seats beneath the shade,
For talking age, and whispering lovers made."

I came down from the slope. I walked along a parish road, ill made, with stunted trees on either side and a grassy border some 20 feet on either side. You will see the significance of that by-and-by. I then came to a meeting house ; and this was the first house that I saw. There stood a wiry labouring man of a superior class, to whom I said, "Which is the way to Lowmarsh!" "Oh!" says he, "this way (pointing south) will take you to the 'Bull-dog,' and that way (pointing east) takes you to the church. If you do not like either you can stop where you are." I reflected a moment what this oracular saying should be, and then immediately there struck up within the walls of this prim and plastered chapel a lustily sung hymn. While I was listening for a moment to this my grey-eyed friend had disappeared and I was left there to go to the "Bull-dog," or to the Church, as I thought fit. Well, I walked towards the Church, and then I came in a few yards to a muddy pond by the side of which was a ruined cottage. Just beyond there was a wheelwright's shop, closed of course, as it was Sunday. Further on there was an old Manor house. There was not a soul to be seen. This house had a garden in front of it. No flowers were there except a few straggling wall flowers. I went into the churchyard, and, as I walked on, I heard the chant within "Lord now lettest thou thy servant depart in peace." I did not enter the church, and it is perhaps fortunate I did not, because I learned sometime afterwards that the churchwarden of this church had got up once after the second lesson and, addressing the clergyman, said, "Stop a moment, Mr. Wood, there's Bessie Thorn and Bill Jones have got something to say to each other ; one at a time, if you please, during service." I did not expose myself to a rebuke of that kind, and I crossed the churchyard. There was no boundary to it. To get to the nearest cottage beyond, I had to pick my way through

pigs' slush from pigstyes ; and through filth from the cottage. The cottage was half in ruins. Just beyond I came to another one, of which I have a rough sketch here. I stopped there



I.—THE COLLEGE.

to see the inhabitants. There were three old maidens, and one of them had been bedridden for ten years. This woman was an object of dread to the neighbours, because



2.—THE BEDRIDDEN SISTER.

she was supposed to have communion in some way with the world beyond, and so they dreaded her. Her house was a freehold, only 10 feet by 12, and was the sole

property of the possessor. Immediately outside the walls, that is to say on the public highway, there was filth of every description. While I was looking at this, and speaking to the sisters, my old friend who gave me the choice between Church and "Bulldog" passed by. "Oh!" he said, "you are looking at our college are you? Are you satisfied? Would you like also to see our water supply. Perhaps you never saw the like." I said, "Well, I should like." He took me to a pit in the middle of a field 300 yards from where we were. The pit was trodden all round by the cattle that went there to drink and deposited their filth upon its margin. While I was looking at it and asking him if it was the only water supply, there came an aged decrepid woman and she said, "So you have come to see our well." I asked her where she came from, and she said from Summerstown, a distance of three-quarters of a mile, and that "there was no water nearer." She went her way. I then said to my friend, "Where is this Summerstown?" He said, "That is a place you might like to see, they are all squatters." I said, "I should like to see them." If I were to give a complete and graphic picture of all this I feel I should occupy your patience too long. But one or two things I must tell you, if you are to have a picture at all. I slept that night at the "Bulldog." There had been a fair the day before. The place was strewn with its litter. There were some rough pedlars and wayfarers who had been at the fair. They made some noise, the greater part of the night. So I was not long in bed, and went early in the morning to see Summerstown. The people were already at their work. It was between four and five in the morning. They were an industrious race, these squatters. The first place I came to was the school of industry, which does not rival the technical institute which we have all come to see here. Here is the cottage to which the technical institute is attached, and here they are taught their trade. In this building, which was about 11 feet by 7, I found thirteen children being taught lace making. I was asked whether I should like to

see where they slept, and I said that I should. They took me to a bedroom, which was the bedroom for a family of



3.—THE TECHNICAL SCHOOLROOM.

eleven. The size of that room was 11 by 12. On this room a remark made was, "They get on pretty well here,



4.—THE INTERIOR OF THE SCHOOL.

only they cannot walk between their beds, because their beds touch." "But," said the man who made

the remark, "it is not so with the Hares." "How is that?" "Because they have got none. Come and see." I went to see the Hares—three brothers. They were sitting in a row on a log. This log was the only furniture they had. The only articles of domestic use were five—a bill-hook, two knives and forks, and half an iron pot. They asked me if I would like to see their bedroom. I went up a ladder which ought to have had six rungs but two were gone. In the bedroom there was some straw which had been slept upon until it was broken small as chaff. The remnants of some old sack cloths were there, used as bed clothes. This, and much else that I could tell you, was a view I had of part of the village life and village health of England not 25 years ago. I have no desire to cause any exaggeration or to produce any sensational effect; on the contrary, I am merely quietly describing some of the conditions of family life, but I am obliged to add that this condition of family life was worse in this country than elsewhere.

I have here a sketch made fifty years ago in the island of St. Kilda. It represents the hovels, nearly dens, into which the inhabitants of St. Kilda crowded.



5.—THE VILLAGE OF ST. KILDA, 1834.

The Macleods have wholly altered St. Kilda now. I have a drawing here of a Micmac Indian wigwam.

These Indians are able to move about as poor people in England cannot, since the freehold of 10ft. by 12ft. is fixed.

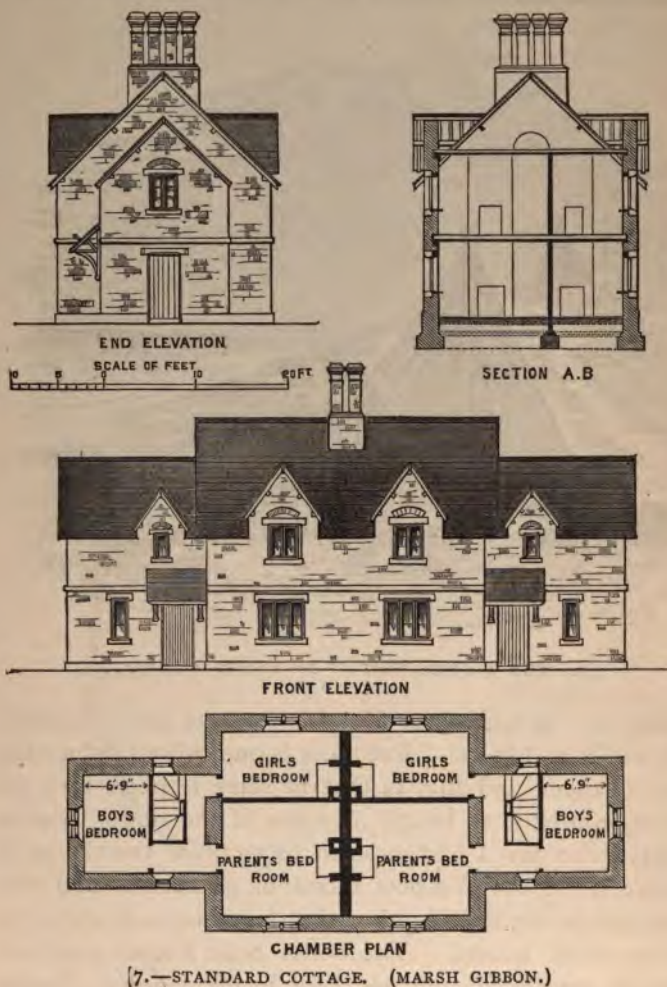
So again in a wholly different climate. I alluded this morning to the great water supply of Carthage, and to some of the tribes who wander over the dry sandy soils there—when the soil gets in a dirty state the tribes move



6.—THE WIGWAM UNIT OF AN INDIAN VILLAGE.

farther on. Some of our English cottages are a frightful evil, social and moral. But there is one curious redeeming point in them, and that is that in some respects they are not so injurious to health as some of the newer houses. Thirty years ago I had occasion to examine the village of Horwood for the Winslow board of guardians, and this came out in the investigation, that fever was not prevalent in the worst houses. The better built houses were not properly ventilated, and not kept in good order. People thought the houses were of a better class because the doors and windows would shut, but some of the tumble-down places, where the roofs were broken and in all directions admitted air, were not nearly so likely to spread fever,

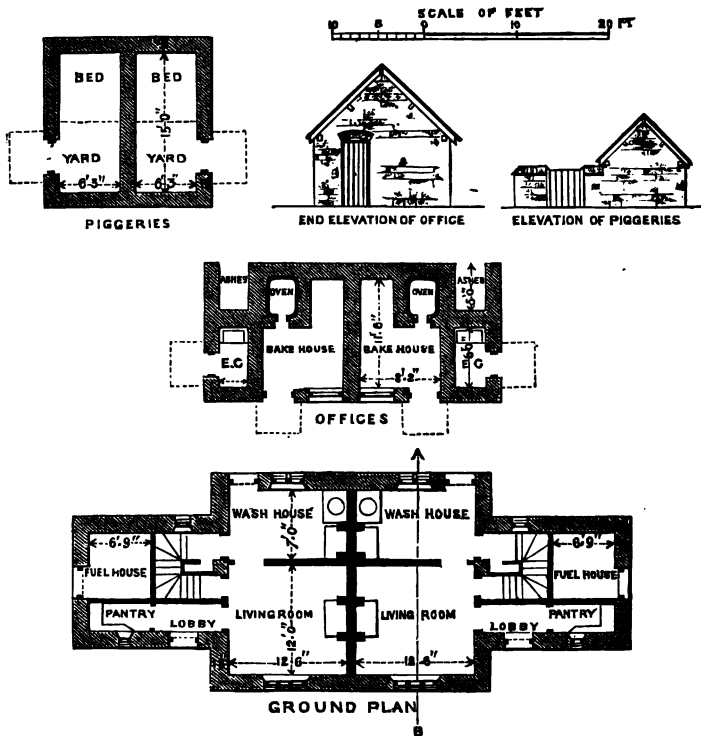
and did not do so. What then is to be done? First of all, we have to establish a model of what may be considered to be the fair and just requirements of an agricultural



labourer's cottage, and that is the next point which I propose to touch upon. I have here what may be considered, I think, to be a typical model of a cottage, or rather, I

should say, a moderate representation of what are the fair wants of an agricultural labourer.

The dimensions are given on a separate plan, and therefore I hope that after the lecture anyone who takes an interest in this question will be able to see it. This is the plan for a double cottage. One positive advantage of



8.—NO. 1. STANDARD COTTAGE. (MARSH GIBBON.)

a double cottage is that the warmth is kept in by the central position of the chimney. You will see the place of the porch and the living room upon the ground floor, the wash house, pantry, and fuel store. The bedrooms upstairs correspond to the rooms below. There is one room 12ft. 6in. by 11ft. 9in., a girl's bed-room 12ft. 6in. by 7, and a boy's bedroom 7ft. by 10 ft. Each of these rooms has a

fireplace, so that there is good ventilation. Twenty-five or thirty feet from the back of the building you will find the arrangements for a closet and bake-house. On either side there is an earth closet, and I shall perhaps find time to say something about it in detail by-and-by. At a certain distance beyond (a point on which, in village administration, I am disposed to lay great stress) there is a pig sty, which pig sty should, I think, be allowed, though it is often disallowed by sanitary authorities. It is permitted in this way. The owner builds the pig sty in his own fashion and he charges rent for it. If the cottagers like to have it they have to keep it in order with the rest of the surroundings. Now if we venture to take this cottage as a standard see what it comes to; 1st, a thoroughly comfortable living room downstairs, which is not so large as to induce them to keep it as a show room; and 2nd, a wash-house or scullery; both rooms being evenly distributed in respect of capacity; so that both are daily occupied. Those who take a theoretical view may say you ought to be ashamed of yourself for supposing that a room 12ft. 6in. by 11ft. 9in. is an adequate room. Abstractedly it is not so; but of this I am sure that convenience and comfort of village tenements depends very much upon the character of the inmates. Given a house like this one, kept reasonably and properly in order by a good landlord, I am sure that for agricultural labourers it gives adequate accommodation. As such, however, it will not pay. This particular cottage lets for £3 a year, and the cost of erecting it some years ago was £300, but now no contractor would build it under £380, and still the rent remains at £3. Taking this cottage as a standard, there are one or two things I am anxious to draw your attention to, especially that of my cultivated and scientific friends. You sometimes hear that laws are laid down that there are to be so many bedrooms of this or that size. But this is not the essential. The essentials are that in any given accommodation, it shall be arranged in the way most suitable to the condition of the people. I

will explain what I mean directly. The Duke of Northumberland was so good as to furnish me with plans adopted by him in the North of England; and the Ecclesiastical Commissioners, through Mr. Gore and Mr. Clutton, have also given me some of their plans which they consider typical.* I will now point out to you the difference. The cottages erected by the Ecclesiastical Commissioners are excellent. You will observe that the arrangements for the ovens and latrines at the back run out into the shed, so that the yards are separate. The inhabitants can have no communication with each other. That seems a good thing, and so it is with certain populations and districts. Now, observe those of the Duke of Northumberland; he has an equally good arrangement, but he has a yard expressly provided as common to the two, with a wall enclosing it, and this he provides in his admirable cottages of two storeys and one storey.

The pitmen and fishermen in the north of England particularly like to have their rooms on one floor. They prefer it, and a wise landlord arranges his building accordingly. But in each case he gives the enclosed yard to protect them from the stormy squalls, which fly unexpectedly over the wild moorland region of that part of the country. That arrangement, apparently so good in isolated parts of England, would not be so good here. I might give many instances bearing on this part of the subject, to show that there is no abstract arrangement of cottages which can be laid down as the only right one, except that of having adequate room below, adequate room above, with proper arrangements for warming, a certain number of bedrooms, and providing suitable arrangements outside.

Now time goes on so rapidly that I scarcely know what point in the wide range of this subject to take next, but I think I had better at once say, that having considered what are the essentials of a dwelling, we must next con-

* See the Handbook on 'Village Health,' Woodcuts 47, 48, 49, 50, 51, 52, and 20, 23, 24, and 28.

sider what are the essentials for village health and village life, besides the dwellings. I have spoken only of the dwellings. You, of course, have heard *ad nauseam*, that there are two other things absolutely necessary for all sound sanitary conditions of dwellings, whether in towns or not, namely, a proper water supply and drainage. With regard to the water supply, that varies according to the locality. In some cases, as in the hilly parts of Lancashire, the rills of water, if looked after with tolerable care, can be kept pure enough for all purposes, but I have seen rills absolutely spoilt by passing through farmyards, when there was no occasion for so doing. I may remark by the way, that there is generally little difficulty in leading the streams as nearly as possible to each cottage, and passing them through small filter-beds. Besides that kind of self-supplying arrangement where you have the streams, you may have recourse to rain-water as they do in Lincolnshire. On the extensive level plains in that county they are obliged to rely almost entirely on rain-water, and to provide, as the Duke of Bedford does, an arrangement for a full rain-water supply. There are many districts where the rain-water supply is scarcely adequate, and even then, from want of care, it is so badly collected in some instances that it cannot be safely used. I am going to give you a typical instance of what has been done in order to meet this difficulty. The best instance I know of is that of Chapel Brampton, which has been arranged by Lord Spencer. If you will take the trouble to examine this plan, or the engravings which I will hand round, you will see how it is done. I am thus able to show you an instance, not a theoretical one but a practical one, of how the water is supplied in certain villages.* Lord Spencer has erected a pumping engine below the village, and brings up the water supply through the whole of the village to every single tenement, exactly the same as if it was in the heart of the metropolis; and there is a corresponding drainage system, to carry away the refuse

* See all these plans in the Handbook on 'Village Health,' Woodcuts 37, 38, 39, 40, 41, 42, 43, 44.

both solid and liquid. In these plans, which I will hand round also, you will see partly the original drawing and partly the engraving; the original drawing being by Mr. Griffith the engineer. I think you will find, according to the general type of the bye-laws of the Local Government Board, that in this rural district there are precisely the same appliances as to water supply, waste preventers and the like, and the same arrangement for house disconnection as have been stated in the meeting to-day to be so essential for large towns. Therefore, any one who desires to see how, with the means of a great landowner fully and kindly alive to the wants of the people, all this can be done, should visit Chapel Brampton, near Tring. In many cases this can be advantageously accomplished by the rates.

You all know how intimately the water supply and the removal of excreta by water carriage are connected. This you will also see illustrated by the plan of Chapel Brampton in the Handbook, or by a visit to the village. I shall not, therefore, dwell further on this. But you will remember that besides this complete system of purification of dwellings by the ordinary arrangement of drains on a complete scale, there is another with which you are all acquainted, upon which I will not dilate in much detail, I refer to the Earth Closet system. It is often impossible, as in the case of Marsh Gibbon, to make such an arrangement as there is at Chapel Brampton, and then you have to resort to the method which is carried out by the Rothschild family in the neighbourhood of Tring, where by a system of surveillance and inspectorship, which is carried on at their own expense, the most perfect cleanliness is secured in every cottage on their estate. It is worth anyone's while to go down to Tring to see this. In the small handbook to which I have so often alluded, you will find a full account of the exact amount of earth which is required, and the expenses which are incurred in the carrying out this mode of scavenging.

So much then concerning the arrangement of the dwellings, the arrangements for the water supply, and the arrange-

ments for the removal of refuse. I hope I have said enough to show the absolute necessity for reform in those of our villages which are not reformed. I have shown the general standard which we should endeavour to adopt, and given a typical instance by which the water supply has been provided, by which drainage has been carried out upon the modern water carriage system. But it is neither by dwellings alone, nor is it by drainage, nor is it by water supply, that village life is to be carried on, or the people kept happy or improved. I often think that some of us have much in this to answer for. Sometimes one would suppose that the life of modern Europe would be renewed directly the joints of the drain pipes have been made sound ; and that there is only one thing to do, to drain the people, and then all will be well with them. We do not really hold that doctrine. I think, as I stated at the outset, you may place people in a position in which moral improvement is all but impossible, and a happy and healthy life unattainable. It is sufficient to say generally that the time has come when village populations must be educated, and by educated I mean taught to do that which they ought to do in the circumstances in which they are placed, and to do it with contentment. For that, they require not only to be intellectually taught, but, in my belief, to be morally and religiously taught, and also to have reasonable recreation and rest. Depend upon it, that without reasonable recreation and rest sound labour becomes unsound. In my poor judgment, a part of the sensational talking and writing of which we have too much in this country, comes because many of our people are overtaxed, and they become over sensitive, and in consequence exacting. But in saying that, do not suppose for a moment that I think the life of our agricultural labourer is otherwise than a hard life ; and a hard life it has been since Abel tilled the ground ; and a hard life it will be as long as tillers of the soil are left ; and the only question is how to make it as little hard as we can. You will excuse me if I read a passage from a friend in the United States, Colonel Waring, an engineer, soldier, and

philanthropist. He says, in describing what is the happy moral life of the people, that a good deal of the "slate and pencil farming" in Massachusetts is most true of the small English farmer. "But when the test of practise is applied to our well-studied and proven scheme ; when we see how far our allowance for chances has fallen below what is needed to cover the contingencies of late springs, dry summers, early frosts, grasshoppers, wireworms, Colorado beetles, midge, weevil, pip, murrain, garget, milk fever, potato rot, oats rust, winter killing and all the rest ; when we learn the degree of vigilance needed to keep every minute of hired labour and team work effectively employed ; and when we come finally to the items of low markets and bad debts ; we shall see how far these and similar drawbacks have undone our arithmetic, and how often our well-contrived balance must be taken into the footings of the other column of figures."

I have said nothing as yet about the care of the village poor in sickness, which may seem to you strange : but a healthy active laborious life is not that which produces sickness ; it is the miserable surroundings which produce sickness. A laborious life makes no one ill, unless he is overworked. There is however one thing which ought to be in every village, and that is a dispensary. A few words will explain a very large subject, and it is this. According to the system of English administration, every person in poverty has the right to medical relief, but in practice what does this come to ? I know many districts where the poor are five or six miles from their doctor, and in Scotland much more. The Government of our country have by no means understood how much easier might be the care of the sick rural poor, if they were to establish in every village a dispensary, to which the Union doctor might come at stated times, and dispense medicines. In Marsh Gibbon, we have that at a cost of £2 14s. a year. A person has hired a room which he gives the doctor, and the doctor keeps his medicines there, and comes at stated times and attends to the poor, to their and his great comfort. This was proposed

to the Poor Law Board twenty-five years ago, but from that time to this scarcely anything in that direction has been done. In many cases in the country the dispensary might be advantageously at the Post Office.

I have, I fear, reached the ordinary time which is allotted to the lecturer. I am very grateful to you for allowing me in this rude way to sketch here and there an illustration of one form of life which, as I stated at the outset, lies at the basis of the National Fabric. I am not a politician, and I certainly shall say nothing about politics here. I feel that there are seven millions of these country people to be cared for. It is a matter of mighty consideration to us that this active and necessary portion of our population, which is beginning to overcrowd the towns to the injury of the towns, should, as far as possible, be made happy in their homes. I will only say one thing more. There are two maps on the wall, upon which are delineated a plan showing a curious part of English History.* You will find that in a parish of 3000 acres, there were within this century no less than 3000 separate properties or tenancies arising out of the system of commons land. I use the word commons land with a certain reservation, for this is a very intricate question. On the map you will see there are little strips of land, only some 4 or 5 yards wide, and about a furlong in length. In each of the maps you will find also that the yeomen who held the land, did not hold necessarily the adjoining strip, but a strip here and there, and some of them held as many as thirty of those strips. The Enclosures Act examined all land of this kind throughout the country, and redistributed these properties, which had arisen as far back as William the Conqueror, and assigned the adjoining land to the people, so as to make small farms which were then enclosed. Now how about our squatters? When I came down off the hill on that hot day, I told you there were twenty feet of grass on either side, and afterwards they said, "Come and see the squatters." These squatters are

* See these Maps in 'Village Health,' pp. 10 and 11.

people who built their hovels on these wastes. They generally were built on the edge of a Common. When the Enclosures Act came into force, the people could not go upon the other land, and the result was that in Summerstown, along the row of cottages there was a long ditch, and this ditch was the only place which could receive the refuse from the cottages, and it was upon this ditch the School of Industry was situated.

Now I will tell you the end of the brothers Hare. Some time afterwards, I went back to Lowmarsh, and I said, "How about the Hares?"

"Oh!" said my old friend, "I will tell you about them. There was a lawyer here one day, and we asked what steps could be taken to reform the brothers who sat on the log. What the lawyer said I do not know. But I know what happened to them. The same evening their brother, who lived in a tenement adjoining with nine children and a wife in the same space, but lived tidily, happily, industriously and thriftily, said, 'I will reform my brother.' With a great beam he knocked down first the roof and then the wall of his brothers' house, and before the three brothers came back their home was gone. This was considered by the inhabitants to be a step in the right direction, and they marched forward in the order of things.

And so I am afraid must end the brief description I have given of some aspects of village life.

Only let me say once more, as I said at the outset, that we are all indebted to those who in the face of whatever difficulties and whatever objections, enable us to meet here face to face to consider in what way we can carry on the happy, peaceful, and if you like to call it so, unscientific education of the people. If I have been able to add anything of interest concerning Village Health, I would only ask you to bear in mind hereafter, that in the word "village," as we understand it in England, as it is understood all over the world, you convey the idea of an important factor in the true life of every country; that in the word "health" you

are dealing with one of the most complicated problems with which man can deal. There is the health of each of us as an individual, as a member of a family, each with its own inherited history. An Exhibition like this makes comprehensible to a certain extent the comparison of National Health among the nations themselves, constituting the great advancing science of Comparative National Health. You have also to grasp the idea that there is some connection between human health and the nature and condition of the animals that inhabit the planet with ourselves. They communicate their diseases to us as well as sustain us.

The CHAIRMAN said he was sure that Dr. Acland had made many persons in metropolitan houses more than ever in love with the conditions of life in which they found themselves, by the graphic picture which he had drawn of unhealthy homes in the country before such changes came over them as had been described. The beautiful picture which he had given of what might be done and had been done must enter into the hearts of everyone, and make them feel grateful to the Institution which enabled them to hear such a lecture as had that afternoon been delivered. He had, therefore, much pleasure in the name of the audience in proposing a hearty vote of thanks to Dr. Acland for his admirable lecture.

The resolution having been unanimously carried, a vote of thanks to the Chairman for his presiding, proposed by Sir Thomas Acland, was unanimously passed.

RECREATION.

BY

S. D. DARBISHIRE, M.D.

JULY 29TH, 1884.

A LECTURE ON RECREATION.

By S. D. DARBISHIRE, M.D.

The Rt. Hon. SIR THOMAS DYKE ACLAND, Bart., M. P.,
was in the chair.

THE CHAIRMAN, in introducing the lecturer, said, a gentleman with whom he was intimately connected had written a book on Health, Work, and Play. They were now assembled in the rooms of the Health Exhibition, and a part of their health depended upon their work and how they conducted it. The lecturer was a man who had done a deal of work both in the cultivation of his own mind and in the care of his fellow-creatures, for between his school life and his professional life he was stroke of the University boat, and if any one knew what that involved, they would see at once that Dr. Darbshire was a most competent authority to speak on work and play. He had much pleasure in introducing Dr. Darbshire.

LECTURE.

Ladies and Gentlemen,—the subject which has been put into my hands to-day is, as you have heard, recreation. In the first place it will be necessary for me to explain exactly what I mean by Recreation. It sounds at first very easy, because every one knows what recreation is,

but before I can speak at any length about it, it will be necessary to explain more exactly and accurately what you are to understand by it. You might say that cricket is a recreation, so it is to most people, but not to a member of the All England Eleven, to whom indeed it would be anything but a recreation. Cutting down trees might be thought a recreation, and to a certain person who holds a high position in England at the present day, it is, but it is not anything of the kind to a woodman. Recreation, though it does not seem to do so at first, requires a distinct definition. If we look to the derivation of the word, it gives us a very good clue as to what we are to understand by it. Recreation means something which re-creates, which makes over again, and so Recreation is a certain employment which re-creates something, namely the strength and the vigour of the human body ; so that a Recreation is an employment or an occupation which serves the end of refreshing, and renewing the strength and tone of the body, of the human machine which we call ourselves, including of course the physical portion and the mental or nervous portion of that machine. Recreation besides serving the end of refreshing and renewing the vigour of the body, does so especially after the body has been wearied and exhausted by one's ordinary life, by the ordinary duties and circumstances of our life as we lead it now. That is a very important point. That at once tells us that the ordinary life which we lead now is not a healthy one. Something is required—something is wanting to make the life healthy which we lead now. We live, and live fairly long, but still the very fact that we do require at sometime during our life, or rather at all times during our life, to have our strength and vigour refreshed, proves that our life is not altogether healthy. Now what kind of life do we lead practically? We spend at least ten hours of the night, and evening, and morning, in a house shut up. The windows are open certainly, but very little. A man of business or a professional man when he leaves his house in the morning goes to another house a

short distance off, and there he spends the whole of his day without fresh air, and when he has finished his work he goes back to his home again and shuts himself up, and there remains for another ten hours, and very often in going from one house to the other he goes either in a cab or by the underground railway. That is not a healthy life. It seems as if he were avoiding fresh air. If we ask ourselves what is wrong in our life, we must ask what is the natural life of a human being. I am speaking now of man not with regard especially to his intellectual capacity and his imaginative power, but from a biological point of view, treating a man as a human machine, as an animal. What is the natural life of man as an animal? We must turn to the anthropologist to answer that question. What has the life of man been? The anthropologist, that is he who studies the history of man, will tell us that for a long series of ages, generation after generation, spreading over a time compared to which the historic period of man's life on earth is almost nothing—the time during which man has lived on the earth of which we have evidence. Before we have any written records of his doings at all, he lived the life practically of a savage in the open air, hunting daily for his food, and living a hard, open-air life. The number of ages during which the race of man has led that kind of life, is overwhelmingly large as compared with the time he has lived a civilised life. I want you to understand that very clearly. Each individual receives some characteristic from his surroundings, and passes it on from generation to generation; and we know that no race of animals can exist without receiving an impression of the characteristics of the race, and the individuals from its surroundings. If we think of the length of time that man in his infancy lived the life of a savage in the open air, who had, as I say, to spend his time in hunting for his food, and so on, we can then see what a very strong impression that life must have left upon the inherited characteristics of the human race. I say this to try and impress upon you how it is that we men and women possess the very characteris-

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tics and qualifications which we do. We do possess them really, from having inherited them generation after generation, from our far-off pre-historic ancestors, who spent their time in the open air. You may think this far fetched, but it is not. If we were discussing any other animal than man, you would accept it quite readily. You would see how an animal developed, and how its various organs were developed, and you would see they were developed during the long ages during which the races of animals live, and so it is with man. If you think of the length of time that man has lived upon this earth as a savage compared with what he has done as a civilised being, you will comprehend he must have gained most of his characteristics during the time he was living the open-air savage life. That is the explanation of why the life of the present day does not suit us. We want a taste of our open-air life. If we had an animal given us to look after, we should at once set to work to find out what the animal did in its own natural life; and so we must find out what man's natural life is; and man's natural life, as far as his physical characteristics go, is an outdoor life. Man is not an indoor animal, but an outdoor animal, and we must remember that most distinctly before we can understand what is wanting in our present mode of life. How does this help us about recreation? In this way; it at once suggests to us that which is wanting in our present mode of life, namely, that we should give the man who leads this unhealthy life a taste of his natural life, and so we do when we give him recreation.

Take a very general class of recreations as an example—that is, sport, hunting, fishing, shooting, stalking, and so on. Those are recreations which come almost natural to man; and I firmly believe that the pleasure that men feel in sport of that nature—all do not feel it, though many do—is really an inherited memory from our far-off ancestors, just in the same way that the form of our hand, or the shape of our foot is inherited from our far-off pre-historic ancestors; so in the same way is one's fondness

for out-of-door sport the inherited memory of those past ages.

Now let us analyse this recreation which I am dealing with. Let us take any sport you like—we will take fishing. The recreation of fishing necessitates being in the open air. It requires a certain amount of muscular exercise, and also a certain mental attention. I venture to say that no recreation can be really good, wholesome recreation which does not have those three characteristics, namely, the need of being in the open air, muscular exercise, and a certain amount of mental effort or attention. All kinds of sport have those characteristics, whether you take hunting or shooting, they all have fresh air, muscular exercises more or less, and mental effort, just what is wanted to carry on the sport successfully.

Now let us pass to what may appear more artificial recreation, such as games, which seem to be made on purpose to answer this end; for instance, the game of cricket is undoubtedly a recreation. Cricket, as everyone knows, is played in the open air; it requires muscular exercise, and it also requires a certain amount of mental effort or attention. Rowing, again, has to be done in the open air, and there you have muscular exercise, and mental effort and attention necessary to row well; you have to understand your watermanship, to know something about the river, and to pay attention to what you are doing while you are doing it; there again you have the three characteristics of the typical recreation.

Now some occupations that are called recreations do not possess those three characteristics, and I consider that those which do not possess them are not good recreations, though they do serve as recreations in their time, such, for instance, as dancing, the game of tennis or rackets, and gymnastics, which are generally performed in a closed room. These are recreations certainly, but in so far as they are not performed in the open air, they are not good recreations.

Again, you may imagine certain sports as recreations in which the muscular exercise is left out, such as going into

the country and sketching. There you have the open air and the mental attention without the muscular exercise, and consequently that does not possess the necessary three qualifications.

Now how do these three qualifications act? Why ought they to be part of a recreation—why is a recreation not complete without the three qualifications which I have made so much of? It is not enough to know that combined they do serve to invigorate and refresh the human body and mind, but we must know how each particular part acts and serves to this particular end. For instance, suppose after any particular hard work a professional man takes his usual fortnight's holiday, and employs it in various pursuits of recreation, how is it he obtains benefit by it. He leaves off his ordinary work, perhaps to his own disadvantage, and when he comes back after his fortnight's holiday he finds it rather difficult to set to work again—how is it that he does gain benefit by it? It is that he is really during his holidays, which he spends in the open air, going back and taking a taste of the savage open-air life of his forefathers. He is living for a time a life which is more natural to his physical constitution than the one he has been leading; that is to say, he is leading the life which is natural to man, and not the life which has been enforced upon him by the ordinary exigencies and civilisation of the day. His life really instead of being one on which calls and demands are made upon his strength and activity to the utmost, is really a vegetating one, he is doing enough to keep his body alive by muscular exercise, and just takes enough mental effort to prevent himself being absolutely thoughtless, and that is, I think, leading the natural life of a human being. That is biologically speaking the natural life of a man.

How do the various points of recreation act towards this end of invigorating the human frame—the body. The fresh air, as I have said, is an absolute necessity to the human being. The animal, man, is a fresh-air animal. He cannot live in close air. Every organ of the man is made

and works in a way that shows that fresh air is absolutely necessary. When he takes exercise in fresh air, the muscular activity demands an increased energy of the functions of the body, especially the breathing and the circulation of the blood. When exercise is taken the breath has to be more frequent and deeper, and the circulation has to be more vigorous, and therefore in the recreation the muscular effort forces the individual to breathe more deeply, and causes his blood to circulate more quickly, and so brings the various organs of his body into more vigorous action. You might ask how can this refresh a man, and you will say, perhaps, that it ought rather to tire him. It is one of the natural functions of the body, and as long as it is called upon by the natural action of the same body, it will not be a strain or too great an effort. With regard to lungs, which are brought into action freely and largely by the muscular exercises in the fresh air, the lungs are really a great deal too big for ordinary purposes. The lungs of a man are of a size which would suit an animal who had to take very violent exercise constantly. That refers back again to what I said at the beginning, how it was that man has gained his physical characteristics. A man's lungs are, as I say, a great deal too big for ordinary use. The whole of the lungs is not used under ordinary circumstances. There is a very important point connected with that, which shows how necessary muscular exercise is as a factor of recreation in the open air.

In performing the ordinary duties of life a man does not use the whole of his lungs. There is one portion which is used very little, and when a man leads a very sedentary life, and seldom or never takes any violent exercise, that portion of the lung is hardly used at all. In the human chest which, as you know, by expanding brings the air into the lungs, the bottom part is freely moveable, but at the top the chest does not expand except under deep inspiration. The portion of the lung encased by the upper part of the chest does not expand, therefore, unless a tolerably violent effort is made, and that portion of the

lung is the very one which is most frequently affected by consumption, and probably from the very reason that it is not used under ordinary circumstances to any very great extent, and so becomes out of order—not in perfect equilibrium and working order. This is only an example of the way in which exercises out of doors would bring the organs into proper working order, and shows you the danger of never making a severe effort, and of never putting our various functions to some considerable strain. One would think it was a good thing to have too much lung, but it really is an evil, unless we use them to the full extent. If we do, we lessen the risk of disease ; if we do not use them to the fullest extent, we lay ourselves open to the chance of disease.

The same thing applies to the other organs of the body more or less, especially the muscles. We are endowed with muscles which are capable of doing a very considerable amount of work, a great deal more than any of us have any idea of. The shape and size of our muscles are inherited from our pre-historic ancestors, who were obliged to use them to gain their livelihood. If we do not use our muscles, they are only in the way, and they may lead to disease. We have the muscles and are obliged to feed them by taking food, and if we do not use them, some of the things that are prepared in the body for the use of the muscles may turn against us, and so occasion disease. It is quite certain many people—I do not say all—could prevent gout if they had taken more regular steady exercise in their youth. It is not safe really for us, when we are endowed with certain functions, and certain organs, to leave them alone—we must use them in order to keep perfectly healthy.

Now we come to mental effort or attention, which I have already spoken of. That seems to me a very important part of a reasonable, sensible recreation. I cannot think that any employment, even in the open air, necessitating muscular exercise, could really serve as a recreation, unless there was attached to it some slight—perhaps very slight—

mental effort or attention. That mental effort is something of this kind, I touched upon it when I spoke of sport. In fishing, the mental effort required is an effort of memory, as to where the fish are to be found, where one saw them before, and what kind of fly should be used, and the effort of watching the places, and of avoiding being seen by the fish. That really is a most essential part of the recreation, as it keeps the mind constantly at work. There is no troublesome logical reasoning, or severe effort of memory, but just a slight effort to remember the rules of the craft one is following, and a slight attention necessary to guide one's thoughts where to go, just enough to keep the mind occupied without tiring it with any severe mental process. So it is with games. The mental effort required in cricket is for the player to keep his attention upon the game, to keep his eye upon the ball, and so on. In fact, it is just enough to keep a man's mind occupied without causing him any severe mental strain.

Such being Recreation, what place ought it to hold in our lives? Some lives, fortunately, are recreation from beginning to end—I am not speaking of those lives, but of those people who have to lead lives which are not healthy—as to those who have not enough fresh air and physical exercise, and too much mental effort. What place ought recreation to hold in those lives? Let us begin at the beginning of childhood. Just as the biologist finds in the very early development of animals, from the very beginning of all things, from the ovum in the various steps up to the completely formed animal, traces of generations that have gone before, that is, certain forms which existed in the previous generations of the animal, appear in some of the earlier stages of development, so if we may take a hint from that and in the infancy of the individual man, we may copy more exactly the circumstances of the infancy of the human race. In childhood, undoubtedly, the life ought to consist almost entirely of recreation, and of such recreation as I have defined and spoken about so far. There should be as much open-air life as possible; there should

be muscular, physical work and exercise, and as far as possible some mental effort. In very young children the latter must be left out at first, but gradually the mental effort should be encouraged. When the child can learn any organised recreation, then he will have the mental effort necessary to encourage the action of the mind in equilibrium with the action of the body. The reason why a child's life should be one of continual recreation is this, that the child when born is endowed, as I have said before, with certain capabilities—I mean, his organs are able to be developed up to a certain point and to a certain capacity, and if a child is born with these potential powers he ought undoubtedly to have the opportunity of their being developed to their full extent. That can only be done by a reasonable and rational recreation. In this instance, of course, the recreation does not carry out actually the definition I gave at first, because the child has not any wearied body to refresh, and does not want his strength renewed. It really is a preparation for his after life. But as it is the natural typical animal life of a human being to take exercise in the open air, so must necessarily the physical education of a child at first be open-air exercise—that is, recreation. As the individual gets older, whether a boy or girl, recreation ought undoubtedly to take a very large part in his or her life—in fact, as much as possible, until the individual becomes fully formed and commences adult life. He has continually the opportunity of developing a little more his various organs and functions. As long as it is possible to get the various powers of the body still nearer to their full development, so ought recreation to form a prominent part of the life of any individual. It is just as necessary for the future life of a woman as for a man that she should be educated during her youth by plenty of outdoor exercise. The duties demanded of her in after life are of a different nature to those of a male, but they require a physical development to the full extent, just as much as in the case of the male.

Of course Recreation in early youth has a chance of

interfering with the intellectual education of the individual. If the youth of either sex are not allowed to waste their hours of recreation, but are made to recreate themselves during their spare hours, then it will all turn to a good end, and improve the individual both physically and mentally. Later on in adult life recreation still takes a prominent part in life, or ought to do so. It is not always possible for the individual to enjoy daily recreation, owing to circumstances which are beyond his control. A professional man is not always able to have his game of lawn tennis or a row on the river every evening, and therefore he must make the best he can of recreation at longer intervals; but however he takes it, it serves the same end, namely, that of invigorating the whole human machine, that is, both physical and mental, and refreshing the strength, and renewing the tone of the body. As to the female adult, what she is to do with regard to recreation it is more difficult to say; but it is just as necessary for her as it is for the male, though unfortunately with her we see another evil crop up. As I have already shown, both men and women have lungs a great deal too large for ordinary use, and women have taken advantage of that to give in, to a certain extent, to the forms of fashion, and so confine the chest in a way which is not in accordance with nature, though from the very fact that the lung capacity of an ordinary individual is far greater than he wants in ordinary life, it does not in the ordinary life of a woman interfere with her health. Yet if women would take recreation to such a violent extent as men do, she would very soon find the necessity of using the whole of the lungs with which she has been endowed. I mention this because it often seems to me strange that woman should not take physical exercise to the same extent that man does, and I have often thought that that must be the reason.

In short, recreation is a necessary part of our life. We really can no more do without a certain amount of recreation in our lives than we can do without breathing or food. The effect is not so certain or immediate, but it

does come sooner or later. If we do not take advantage of our opportunities in taking part in recreation we shall certainly feel the evil of it later on. Physical exercise in the open air strengthens every organ of the body, and, as it were, raises up a defence against disease. If you knew how much stronger in every way, not only physically, but morally and mentally, an individual is who exercises all the functions of his body equally and well, you would never doubt that recreation is an absolute necessity of life. The evils which the want of it gives rise to, are not very prominent, and they are so common that one is rather inclined to look upon them as the usual things in a human being. If you can see the difference you often have an opportunity of doing, between a healthy undergraduate who has been dividing his time fairly, justly, and equally between his lectures and his recreation, and a professional man who has been obliged to spend hour after hour either in his counting house or his office, you will see the difference between the two modes of life, and the difference internally is no less than the difference presented to the eye by the two individuals. In the one case you will see the brown skin, speaking of exposure to the open air, and you will see the elastic carriage, full of vigour and energy ; while in the other instance you see a colourless face, opaque skin, slouching gait, and lax muscles, which bespeak weariness and weakness. The two show you very distinctly the difference between a life without recreation and a life with recreation. Too much time can be spent upon it most certainly, and some may sacrifice themselves for the good of others in taking a prominent place in any given recreation ; but on the average, taking one person with another, the amount of time spent on recreation is always of advantage, and always brings forth fruit in later years. Recreation is, as I have said before, as necessary to the human machine as bread and air.

Mr. ARTHUR MILLS begged to propose a cordial vote of thanks to Dr. Darbishire for his excellent lecture.

Sir HENRY ACLAND, in seconding the motion, said Mr.

Darbishire was pretty well known all over England and the United States as an illustration of his own doctrine. He had shown in his own person in the University races the truth of what he had said, and he had devoted himself in a manly way to his work in the University, and now that he was a physician in a large hospital at Oxford he still advocated the idea that a healthy, wise, unexcited recreation was part of the necessity of the nation. It almost made one weep to think of the thousands and millions that are being bred up in this country and in a few great towns, though in none like London, who could not secure the blessing and advantage which had been described as the necessity of man. He had taken an opportunity in that room before of saying, and he now repeated it, that all blessing should attend that great Exhibition which had manfully shown that it was not by learning only, or by science or research that a nation was to be made, but that the development of all the qualities intellectual, physical, moral, and religious, were necessary for the making of a great man, and for building up through great men any great nation ; or when the nation had been made, if it meant to continue on the earth as it had done, to bear in mind the same principles, that it was by the development of the whole man only that the nation could continue to hold its place upon the earth.

The resolution passed unanimously.

**AMBULANCE ORGANISATION IN
WAR AND PEACE.**

BY

SURGEON-MAJOR G. J. H. EVATT, M.D., A.M.D.

JUNE 26TH, 1884.

A LECTURE ON AMBULANCE ORGANISATION IN WAR AND PEACE.

By Surgeon-Major G. J. H. EVATT, M.D., A.M.D.

Sir W. MACCORMACK, F.R.C.S., in the Chair.

The CHAIRMAN: Ladies and Gentlemen—Dr. Evatt has been good enough to attend here for the purpose of giving us a lecture on Ambulance Organisation, and I will at once call upon him to deliver it without further preface.

Surgeon-Major EVATT: Sir William MacCormack, Ladies and Gentlemen—in speaking to-night about Ambulance Organization, I do not propose to refer in any way to the absolute medical treatment of the sick and wounded, but I propose rather to deal with the question how wounded men are transported from the scene of injury to the hospitals, and how aid is to be carried to the wounded in war, on the field of battle. I propose, in short, to deal with the military medical arrangements in war time, and I shall also say something as to the civil arrangements for giving ambulance aid in England, America, and also on the Continent. I will first ask you to follow me in a short description of the rules that govern military arrangements for the purpose of giving ambulance-aid in war time. If you will be good enough to look at this map, you will find it is a diagram shewing the whole of the battalions, regiments,

batteries, and units in an English Army Corps. An English Army Corps is the largest organised unit of the entire body of the English army. It consists of 36,000 men, 12,900 horses, and 90 pieces of artillery, besides about 1400 carts and wagons. That organisation is broken up into smaller parts, just as countries are broken up into counties, counties into townships, and townships into streets and houses. In the same way an Army Corps is broken up into a first division, a second division, and a third division of infantry, a cavalry brigade, and artillery—that is to say, a body of troops, artillery and engineers, which is called the Corps Troops. Those divisions and brigades are again broken up into minor units, consisting of infantry battalions, cavalry regiments, and batteries; and in those divisions there are twelve units—that is to say, six regiments of infantry, a regiment of cavalry, and four batteries of artillery. There is also a company of engineers. In the division of the corps artillery, there are thirty guns, which are divided into five batteries, and there are two companies of sappers and miners. That is an English Army Corps as it stands in battle array, but the question for us to consider is, how the ambulance arrangements are governed, and how the sick and wounded men are cared for. Now, it is arranged in this way. With every battalion or regiment, or battery, is posted a medical officer. He has with him from two to four men per company, who are trained in ambulance drill. When a man is shot down in battle, those men are on the spot to immediately attend to him, stop the bleeding, and put on the first rough dressing; but then the question arises, what is to become of the wounded man? and here is where the modern arrangements are, I think, so good. When a man is struck down in this battalion, say *here*, his wounds are dressed at first roughly by the regimental surgeon, and he is taken out of the range of fire. He then comes under a new organisation, which is called the bearer ambulance company. Those bearer ambulance companies consist of about 200 soldiers of the Army Hospital Corps and eight medical

officers, and they form a distinctly new unit in military organisation. If you go back thirty years to the time of the Crimean War, you will find that owing to the absence of this organisation, great suffering occurred among the troops, and that has gone on until down almost to the present time. Down to the era of the Franco-German War, the arrangements in our army for affording aid to the wounded were very defective indeed. The only arrangements which existed were battalion arrangements, that is to say, simply the regimental surgeon and his men. But the question to be considered is what is to be done with the wounded men when they are struck down. If the regiment goes on to pursue an enemy in time of war, what is to become of the wounded men? If they go along with the body of the army, they so hamper the movements of the army, that the troops cannot move on rapidly; therefore the wounded men either cannot go with them at all, or, if they are left behind, they must remain without receiving proper aid. Now, for this purpose, there is a special bearer-company provided. They are carried back to the bearer-company, where there are plenty of surgical instruments, all necessary appliances, cooking apparatus, and plenty of covering for the men. This bearer-company has its own transport, and it can move rapidly forwards with the army, or backwards as it is wanted. The wounded men are taken there, and there the men get their soup; there they get the first dressing of their wounds thoroughly well done, and from that, if necessary, they pass back to what are called the field hospitals. You must remember in the Crimean campaign, and in fact until recently, we had no proper military field hospitals organised. When regiments have to go on after the enemy, the question arises, who is to look after the hospitals on the ground. If the hospital remains behind, the regiment must go on without it; and if the hospital is to go on with the regiment, they cannot advance rapidly. And we have instituted instead of these 48 little regimental divisions 25 field hospitals. You see them *here*—2 for the first division, 2 for the second division, and 2 for the third division. There are six of

these hospitals empty *here*, with all their arrangements and appliances ready for the reception of the wounded troops, and when 2 of those in front are full of wounded troops, then 2 of the reserve ones move up, and the division or the regiment moves on after the enemy with the empty hospitals, ready for a new supply of wounded. If a man, after being treated, recovers sufficiently, he goes back and rejoins his regiment; but if he does not recover, he then passes on from hospital to hospital along this line of communication which you see *here*. This long line of road has on it a number of hospitals, of which there are supposed to be 25; and at the base of operations where the army lands, in Egypt, South Africa, or wherever it may be upon coming from England, you will find two or three large base hospitals grouped together, which will take 600 or 700 men. As I said before, if the men recover there, they then rejoin their regiments; but if they are hopelessly broken down, too badly wounded for service (and I may tell you they do not in war break down hopelessly for slight injuries), they go on to the regularly fitted hospital ships, and are passed on home to Netley, Woolwich, Portsmouth, and the other great army hospitals in England. When the man is hit at the front on the battlefield, he goes back to the bearer company; he gets there his soup, wine, or whatever is wanted, and is passed on to the field hospitals; and if he then recovers he goes back to his regiment, or if he does not, he goes on to the base hospital; and if he does not there recover, he goes on to a regularly equipped hospital ship, and passes on his voyage home to England. Now that is what is called the Army Ambulance Organisation system. Of course it looks very well on paper, and will no doubt work very well one day. But if you look at this map you will see how necessary it is that there should be sufficient men for the work, unless we are to have constant bother in the working of our hospitals. These small hospitals must remain there, and the question is whether they are to be sufficiently armed with men to do their work. When an

English field hospital takes the field, with its 200 wounded men, it gets only 37 men of the Army Hospital Corps to work it; 37 men are given to the doctors to care for 200 men. You must remember that a sick man in war-time is a very different patient from a sick man in time of peace. In time of peace a man may come into an hospital with a foot sore, or a bad cut, or with anything that disables him from performing the duties of a soldier. That is in times of peace; but in war time a man would be ashamed to go in with any trifling ailment, such as he would come in with in time of peace, and therefore the men who come in in war time are men who are hopelessly disabled, and unable to look after themselves. Therefore we want for those hopelessly broken down men a large nursing staff. Now let us see whether we have got that large nursing staff. There are 37 men of the Army Hospital Corps given to us to do the work; they are divided into nursing men, orderly clerks, cooks, and store-keepers. There are 22 orderly nurses, and the whole work falls on those 22 nursing orderlies, so that would only allow one orderly for every 10 or 11 patients. I have already said that military hospital patients are in war time very different to what they are in times of peace; in war time the patients are hopelessly prostrate, and they must have everything done for them. You will, therefore, at once see that the same number of nursing orderlies would never do in war time as will do in time of peace.

But where an English hospital is completely handicapped is in what is called the minor service. We are always fighting in India, we never have peace there, and the consequence is that we are trained to be perpetually ready for war. In India we receive 122 men to do the work, and I think you will at once see that there must be something very wrong somewhere; either we must be very much over-numbered in India, or hopelessly under-manned in England, and I think I can show you the reason why. Those men are told off to act as dressers, clerks, and cooks. There are many other things to be done in India—for instance, we

have fifteen water-men or water-carriers given to us, and for the same hospital service in English hospitals we have not one single man to carry water for us, and the reason no doubt is that in our English hospitals at home there is always a magnificent system of water supply ; that is the case at Woolwich or Netley, or any of the great military hospitals. You simply go into the sick ward and turn a tap and the water flows for you. But you could not go and turn a tap and get water at Ismailia or Tel-el-Kebir. You did not get water in that way in Egypt ; and it came to the doctors themselves having to go to the river and drag up the water that was required for the wounded. Now you come to another important question, and that is the washing of the patients' clothes. Although people talk about the pomp and glory of war, you must know that the soldier is terribly vermin-covered in war time ; soldiers in war time suffer most awfully from lice and other vermin ; they pursue the soldier everywhere ; and when a man gets sick and broken down with disease so as to be utterly prostrate and helpless, he becomes literally covered with vermin. In the Crimean War ghastly stories were told of the men being covered and infested with vermin when lying prostrate with wounds or from sickness ; and they will always be covered with vermin unless you get men to wash their clothes. It is all very well to say that, and to talk about it, but you must have men given to you to do it, and in the Egyptian war we had no men given to us of any kind whatever to wash the clothes of the wounded. Nevertheless we are blamed if the men are dirty ; and I say some expression of public opinion is wanted to strengthen our medical officers' hands, in order to enable them to do the work which they have to do, otherwise do not blame them.

There is another important thing, and it is this ; that in a hospital at home, say at Netley or Woolwich, you have a magnificent system of sewerage ; that is to say, at great cost Government drains those hospitals perfectly ; they lay out thousands of pounds to carry off the sewerage of those

great hospitals, but in war time men suffer awfully from dysentery and typhoid fever, which requires an immense amount of sanitary arrangements to be provided. In India we had twenty-three men given to us to keep the hospitals clean and in order, but when we went to Egypt we had not a single man given to us for the purpose, so that it is impossible to make our English military hospitals, manned as they are at present, do the work, and the doctors will break down, as they have always broken down, in the effort to try to drive a machine which has not got the necessary driving power. You may be perfectly assured of one thing, that in war time the hospitals will break down if you do not give the doctors enough men to do the work. You cannot make the clothes wash themselves; and they will not be washed if you do not give the necessary washers; and you cannot make the water flow, like Moses of old, by striking the rock. I say it is to the interest of the nation, if you want to have your brothers cured when they are struck down by either wounds or disease, to provide the necessary means. You must not judge the army by the marching past standard, that is nowhere at all; but you must suppose that you have all those men in the field, that our hospitals are filled with wounded men without a single drop of water; hospitals without sewerage arrangements. That is war, gentlemen, and you must have proper arrangements or your hospitals will break down.

So far that deals with the regular army: and we will now advance a step further and come to the militia and to the volunteers. The militia at the present time in England are distinctly in the same position as we were in the Crimean war. They have no medical arrangements of any kind whatever; they have of course the battalion surgeon and his men, but a battalion surgeon and his men at Tel-el-Kebir could not make the hospital away at Ismailia do its work. There is no hospital corps, in short, for the militia of any kind whatever. You have militia in the various branches: you have artillery militia, you have infantry militia, and you

have engineer militia, but you have no medical militia of any kind whatever, and when a big war comes you will find the want of these things. You want medical arrangements of that kind, just as much as you want your muskets or guns, or anything else.

Now we come to the volunteers. We have in England 200,000 volunteer soldiers, and we have in the regiments two or three battalion surgeons. You see the men marching past with their stretcher-bearers, and you think it is war. They, too, think it is war ; but you do not see the dark side of the picture, because they have no hospital arrangements of any kind, they have no ambulance corps of any kind, no medical corps whatever, and they are perfectly ready to break down whenever war comes. Why ? because they do not know that behind those other arrangements there must be hospital arrangements for their wounded men, and I think the volunteer surgeons are beginning to see that. They are beginning to see that it is not merely enough to march past with cocked hat and sword, and a small body of stretcher-bearers ; but there is now a movement on foot to provide the necessary medical officers and bearer companies, and I think the result will be that you will, after some time, see all over England organised medical men and ambulance corps. You will find that they will volunteer for that purpose just as the Post Office Volunteers, the 24th Middlesex, Col. Du Platt Taylor's regiment volunteered for Egypt, who will come out and serve in a campaign. I have no doubt whatever, that if I were allowed to put an advertisement in the *Times* when war breaks out, I could fill my hospitals with the best men in England, if I could only say to them, Men and Women of England, come and serve your country ! When war broke out in Egypt the other day, 1000 ladies volunteered to go out to Egypt to nurse the sick and wounded. It would be the same also with horses. I could provide the best horses for my wounded men. So it would be with nurses. If I could only ask for them I could get them ; but unfortunately the medical men do not command the army and

their hands are tied ; and it is your fault if you do not do something in the matter, because, after all, it is your army, remember. We have gone to the medical students of London, who will one day be your medical practitioners of England, to learn the ambulance work, and to learn all about the work of field hospitals, and to do all their work of private surgeons, so that they may learn to act as surgeons if required for the volunteer army. Many of them volunteered to do the work ; but unfortunately they have no uniform, and no capitation grant from the Government ; but nevertheless they are learning the work for the sake of their country. If a medical student goes into a volunteer corps, and learns how to shoot a man, he can get the capitation grant, but another medical student who merely learns to work in the hospitals, for the sake of his country, does not get anything at all ; and I think medical men who are willing to do that work deserve the capitation grant as much as the men who learn their musketry drill. That deals with the question of military organisation ; and I will now just say a word about volunteer war aid. If we organise a volunteer corps of that kind in England, we shall be doing what has been done on the Continent by the Red Cross Society. M. Henri Dunard, a Swiss gentleman, organised that society in Geneva after he had seen the sufferings of the troops in the Italian war, and the Swiss people then came forward to serve as volunteers in the hospitals. Practically, those gentlemen who were practising this work in peace time would come forward and give those aids that we want in war time. In Germany they have a very valuable assistant to these societies, that is to say, they have a women's branch of the society, a frauverein. We want that in England for the army ; we want a branch of women organised to assist the male society, and women would be very valuable for the purpose, because women would come forward, and they would have great power of getting public opinion interested in the matter, and of getting money too, when once it was seen what was wanted. And, gentlemen, I think in England you ought to have a

women's branch of the Red Cross organisation. Now that disposes of the question of military organisation. As to civil ambulance work, day by day in London, and all over England, a vast number of people have been struck down; there is not a frost comes to this country but men and women fall down and break their bones, but where is the aid for them? I say that ambulance aid is in its infancy in England, and it is only growing up by the knowledge of what we are doing in war time. However, ambulances are being provided in different directions. I have here a diagram of some of the English ambulance systems. This is the ambulance system of the Metropolitan Asylums Board. This is the system of ambulance work done in London which I think is as good as any city could possibly boast of. About eight or nine years ago each parish in London dealt with its own smallpox patients, and with its own cases of infectious disease; whenever those diseases or cases occurred in a parish they were dealt with in it. In Charlton and Woolwich a patient was driven fifteen miles sitting on a board in a conveyance in which he could not lie down; in the case of Shoreditch in the smallpox cab, a patient could not lie down, and the patients could not lie down in the St. Pancras arrangements. You see, therefore, that seven or eight years ago there was an extraordinary system of ambulance neglect, but we have now in London under the Metropolitan Board, a very perfect arrangement, and it is this: at Norfolk Street, in the Strand, is a central office of the Metropolitan Asylums Board; they have telephone arrangements and wires laid on to the different smallpox hospitals. There are several of these hospitals—one at Deptford, one at Stockwell, one at Fulham, one at Hampstead, and another at Homerton, and from this central office telephone wires run to those outlying hospitals. In those hospitals there are ambulance stations, with cabs and horses always ready. I made it my business some time ago to visit them, and I must say I never saw anything more perfect than the arrangements of the Metropolitan Asylums Board. In a few minutes after the message

comes in, arrangements are made for bringing in the patient. In those different hospitals fifty patients can be taken in that way, but the great reserve hospitals are not in London at all, and from those hospitals ambulance wagons carry the surplus patients down to piers upon the river; there is one pier at Fulham—Fulham pier; another at Acorn Wharf, and another at Blackwall on the river itself. There runs up and down a very comfortable little steamer called the *Red Cross*. It goes up and down, and takes the surplus light and mild cases of smallpox and carries them down the river to Dartford and Purfleet; and on the river at Purfleet are moored three hospital ships, the *Atlas*, the *Endymion*, and the *Castalia*. On those ships smallpox cases are collected in great numbers. But close by, at Darenth, on the shore, they have an enormous hospital under canvas; they had the other day 700 patients at that large hospital. So that you see the whole of the smallpox of London is being carried down to that open country round about Dartford, and the whole of that arrangement is, I think, perfect, and it has superseded the old arrangements for dealing with smallpox cases in the London parishes.

We will pass on now from the general question of organisation, and come to the details of equipment. I saw some time since in the city a drunken man—he was simply poisoned by liquor. He was in a stage of alcohol poisoning, and four or five or six policemen were fighting desperately with him; he was well dressed, and looked like a gentleman, and there he was fighting and struggling, his clothes were torn, and his hat smashed. I asked one of the policemen why he knocked the man about so much, and he said, "Well, I am treating him the same as he has done me." I say that sight was a disgrace to civilization, and I say if a man is suffering from drink poisoning, you should treat him exactly as if he were suffering from ordinary poisoning. I would put in every street in London a locker the same as the letter-boxes, and I would keep in it a stretcher, so that if a man fell down in the street, or if a man was drunk, the

policeman on the beat would not have to run far away from him to get assistance, but could get it in every street ; and it would be so easy a thing for him to do this that he would never struggle with a drunken man, but get the stretcher, strap him down upon it, and carry him away. In America if a man falls down and breaks his leg, the people do not hustle him off in a hansom cab to the hospital, but they have telephonic arrangement with the hospital, a message is sent, an ambulance comes down, and the man is carried away. A very prominent public authority told me the other day that he had been in the habit of sending men with broken bones away in cabs to the hospitals ; he was a man of the warmest heart, but he was in the habit of doing that. That shows that we have not yet taught the people. People do not know what the want of these appliances means, and that if a man's thigh is broken you must take him off carefully to where he can be treated. I say if you provide a stretcher in every street you will do much for the people, and you will effect a very great saving in the hospital treatment. I say, too, that every railway should do the same thing. I asked the station-master at Woolwich station the other day how would a man be got upstairs if he broke his leg down here, and he said they would get him up as well as they could ; but I say that is not a proper thing, they should provide accommodation of that kind for the people who are injured at railway stations. Then again, people are injured on the railway lines, and the railway companies should provide carrying chairs, so that when a man is hurt he can be put on a chair and carried to the nearest hospital. When an accident happens on a railway a break-down train goes down to the spot, and in it there should be an ambulance carriage sent for the sufferers. As I have said, the Poor Law should in fact provide for ambulance carriages for the public. There is one person who has done this work most admirably, and that is Lady Brassey. She has regularly covered the whole country round at Battle with ambulances. Every parish round about in the place has them where Lady Brassey

lives, and she has certainly cared in the most admirable way for the wounded.

I would now just say one word with regard to the St. John's Ambulance Association. The St. John's Ambulance Association have gone into the country districts, and have taught the people enormously in this direction. I have myself examined into its working, and I can say they do their work exceedingly well, and that the people of England owe a great deal to the St. John's Ambulance Association. They have done an immense deal of good to the people, and are also making numbers of people well acquainted with the way to do their work.

Well, now, we will go on to deal with the question of the materials necessary to deal with wounded men. This is the army stretcher, which is used for carrying wounded soldiers. It weighs about 32 lbs., and is very heavy; it is, in fact, a killing weight with a man upon it, and we ought to have a much lighter structure than the one here. I have here also what is called the Lowmoor jacket. That figure represents a miner. By means of this appliance you could carry a man up the shaft of a mine. When a man is put on this stretcher there is a regular jacket which goes over him, there is a waistband here which goes round the man's waist and supports him, and there is an iron bar which goes over the handles of the stretcher and comes down to this brace, and another band comes down the legs, so that the man is regularly slung, and then there is a piece of tape here which supports the body. So that it is possible by this means to carry a man up the shaft of a mine perfectly horizontally. I think a good arrangement of that kind on board ship would be very useful. I have also on the wall some pictures which I have had drawn of the way in which in war time men are carried. On the upper picture there is a representation of a mule panier; two wounded men are suspended, one on either side of a mule; but for bad cases of fracture of the leg, of course a mule is a very difficult animal to deal with; mules are bad tempered, and the wounded men suffer very much while

they are being carried. Below here is another mule panier ; it is like the chair used in the Pyrenees for carrying wheat ; the men sit on each side of the mule, and these are for light cases—they sit two on each side of the mule. The other one is for the grave cases, for men who could not possibly sit up. In the late Egyptian campaign we found it was impossible to get mules to use for this purpose, and the probability is that horses will be provided in the next campaign for carrying men. Horses ought to be used for the purpose, as they are much more tractable and easily managed.

We will now pass on to another subject, and that is the articles which are used for the purpose of carriage. The paniers are the mule paniers, which are used for carrying the medical equipments in war time. The result of that will be that most of our equipments will be packed away in boxes as these are ; and these two cases open out and make a very good operating-table. They are, of course, very useful. We then come to look through the different carriages used in hospitals. This one represents an ambulance in which wounded men are carried off the field. We propose a much lighter wagon than that, and it would be impossible at the present moment to explain to you all its drawbacks. I had a picture drawn of the trains which are used on the Continent, which occupy a prominent position in the arrangements for dealing with wounded men. This is an Austrian arrangement, showing the constitution of a train for that purpose. This picture here shows the kitchen of the same train, and you come up here by the same door and go right through the carriage. It is an admirable arrangement ; you can cook there for the wounded men, and then there are wagons for the linen and for the medicines. In that way during the German war an immense number of wounded men were carried back from the front. There are also here different ways shown of turning public carriages into ambulance carriages, such as tramways, and using them for the purpose of carrying wounded men.

I have no time to go through the subject of hospital ships, but I hope you will see that it is possible to do something in this matter ; and I should be very happy if anything could be done to work out what I have suggested with regard to providing ambulance arrangements for the volunteers.

The CHAIRMAN :—Ladies and gentlemen, I am sure we are all very much indebted to Surgeon-Major Evatt for having given us this very interesting lecture, and for having called our attention so forcibly to the great want there is in this country of better means for the transport of the sick and wounded. He has alluded to the arrangements in America, which are very much more complete than ours. It is a somewhat remarkable thing that in this, the largest city of the world, that if a man falls sick, or is knocked down or injured in the street, or is unable to help himself, there is scarcely any means of carrying him to a place where medical assistance can be given to him. In New York if such an accident happens to a man there is, from the nearest police station, communication direct with the nearest hospital, and there both night and day stand horses harnessed to ambulance carriages of very perfect construction. A surgeon is also always in constant duty, and he steps into the ambulance carriage and goes at once to the place where the wounded or sick man is, and there is put in that carriage every appliance that can possibly be required for rendering immediate aid to those injured or wounded, or sick persons, and in the very shortest time he is conveyed to the nearest hospital. I think it will be a great good if from the lecture which we have just heard on this subject, and from the lectures which have been given on similar subjects, attention should be called to these matters in this great capital. Another point that Dr. Evatt has called attention to is certainly one which is very much to be inquired into, and that is, as organised at present, our volunteer army, much praised as it deserves, and much praise as it very properly gets, is without a medical service at all. No doubt there are surgeons in it, but any one who

knows what war is—war fitly or aptly described as “an epidemic of injuries”—knows that surgeons can do nothing unless they have at their backs an enormous amount of assistance. It is to be hoped that there may be soon provided by the Government the necessary assistance, and that the Government will undertake to provide a skilled staff for the surgeons of the different volunteer regiments. Another matter in which our cousins across the Atlantic are far ahead of us is, that they not only have arrangements for sending immediate aids to the sick and injured people, but in Boston and Philadelphia there is a central office, one in each of those towns, and from any part of the town, or from any part of the country for say 100 miles around, by the communications which they have, both by telephone and by telegraph, a message can be sent for a skilled nurse to aid a sick or wounded person. A message is sent to the central office, and from the central office to the registered office where trained and accomplished nurses are kept, or with the residences of those nurses, there is instant telephonic communication; and by the first train, or by the first conveyance that can be procured, a nurse is despatched to the sick or injured person. I think that is a very good thing, and a thing which is well worthy the consideration, and perhaps of imitation, by ourselves. Unless any person here would like to make some comments on Dr. Evatt’s interesting lecture, I think we have only to thank him very much for his kindness in coming to give it.

A VISITOR: Mr. Chairman, I should like to point out one error, which I am sure Dr. Evatt did not intentionally make, relative to the Metropolitan Asylums Board. They are not connected with any telephone station; they have private telephones of their own, but they are not in connection with the public telephone stations. I am myself a guardian of Bethnal Green, and I know that we should be glad to be put in communication with such a central station if the Metropolitan Asylums Board were in connection with such a station. But they are not, and consequently, if we wish to communicate with Norfolk

Street, we must be put to great expense, and must have a private telephone of our own, which would cost a large sum of money. But the whole of the parishes could be put in communication at a cost of only 20*l.* a year, if the Metropolitan Asylums Board were connected with any central telephone station; any parish could be put in communication also with that station, and we could communicate at once with Norfolk Street. Last Tuesday was our Board day, and we had two cases then of smallpox. They were discovered among our out-door persons who were applying for relief, and it was quite an hour before it was discovered by the doctors that they were there. After they were discovered, in consequence of the order that has been sent down to us, that instead of sending them to London Fields, which is only a quarter of a mile off, the order was sent to us that we should send to Norfolk Street to communicate the fact that we had such patients who require removal. The Norfolk Street authorities then communicate with a station which is close to us, at London Fields, and from Norfolk Street really the notice is sent to us for the ambulance for the patient that is waiting. So that it was two hours after we had discovered the cases, or about that time, before anything was done. We have had four cases within a month, and in each case that has been the result, for want of the Metropolitan Asylums Board being in direct communication with the central office. The next thing we complain of—I do not think I am out of order—is, that when the patient is taken away, he is taken to Homerton, something on the same principle as these parcels-collecting vans collect parcels and take them to one central spot, where they are redistributed for the places where they have to go. That is just the system in the case of the patients I am speaking of. They were taken in the first instance up to the Homerton Hospital; it was then determined where they should be sent, and it not unfrequently happens that the patients pass their own homes, where they were first taken from. They are then sent either to Darenth or to the river-hospitals, or whatever

other receiving-place is determined upon by the doctor at Homerton. I speak of that because the system is not so perfect, I think, as our lecturer has held out before us ; it is far from perfect to our satisfaction, at any rate. I am quite satisfied he was not aware that that was the state of things, and perhaps my naming those cases to-day may have something to do in remedying it.

(The vote of thanks was carried unanimously.)

PREVENTION OF CHOLERA.

BY

PROFESSOR F. DE CHAUMONT, M.D., F.R.S.

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A LECTURE ON PREVENTION OF
CHOLERA.

By PROFESSOR F. DE CHAUMONT, M.D., F.R.S.

DR. G. BUCHANAN, F.R.S., in the Chair.

THE CHAIRMAN, in introducing Professor de Chaumont, said no one was better fitted than this gentleman to lecture upon the subject of cholera, which he need hardly say was attracting, and deserved to attract, special attention throughout Europe at the present moment.

LECTURE.

PROFESSOR DE CHAUMONT: Mr. President, ladies, and gentlemen, cholera is unquestionably the most dreaded disease of modern times, and that for several reasons. In the first place the disease is practically a new one in this century to Europe, as it is only fifty-four years since it first reached this quarter of the world, and this first invasion of it is vividly impressed upon the memory of many who are still living. The second reason why cholera is so much dreaded is the remarkable suddenness of the attack, the shortness of the duration of the disease, the great proportion of mortality, and the ghastly character of the disease itself. The third cause is that unlike a good many other epidemics it does not seem to be limited in any way by

locality, latitude, longitude, or even temperature or atmospheric conditions, because we find it has invaded almost every part of the earth, and has even reached a considerable elevation above the earth's surface. Now it differs in this way from other epidemic diseases which this country has suffered from and which have been met with in other parts of the world. I may mention in the first place, as to the most dreaded disease we have had in this country before, namely, the Oriental Plague, that this invaded this country many times, and even in the seventeenth century there were two great invasions of the plague before the final one which closed its history in these Islands, namely, in the reign of James I., and again in the year of the accession of Charles I. But both of these were small in extent as compared to the great one which took place in the year 1665. But the plague, terrible as it was, had a peculiarity, and this was that it was unable to maintain its virulence under certain conditions of temperature. In the tropics, for instance, the plague was rare ; and in Egypt where it was common enough in former times, it was a matter of general remark that it ceased always after St. John the Baptist's day, that is, midsummer-day. The extreme heat of the air after that time apparently destroyed its virulence for the time being. The same has been observed with regard to small-pox. Small-pox dies out generally in extremely hot weather, and on the west coast of Africa, when the hot wind blows, the vaccine virus loses its efficiency and cannot be made to produce the ordinary vaccine pustule.

Turning again to the question of cholera, this disease has no doubt been known in India from time immemorial, but India, like many other eastern countries, is a land without a history. We have next to no records of the domestic, and very few even of the political history of that immense tract of country. Our historians, at the present time, are obliged laboriously to piece together the few fragments they can get from inscriptions and other less perishable monuments in order to get any leading idea even of the history of the country, and, consequently, any idea of getting at the

domestic history of it is almost impossible. Still we have some records, and one writer, Professor Hirsch, an eminent etiologist in Germany, has gone so far as to declare that cholera reached Europe so early as the eleventh century—that it reached Constantinople. This, however, seems rather doubtful, and the only true records we have are those which are obtainable since Europeans arrived in India and began that intercourse with it which now goes on so rapidly and so continuously. Now we have, from the writings of a Portuguese gentleman named Correa, records of cholera as existing in 1503 in India, and later on Garcia d'Orta, a well-known scientific Portuguese, who travelled in the East in those times, gave a very graphic description of an outbreak of cholera which he observed. Various other outbreaks we have some dim information about down to the latter part of the eighteenth century, but we know, from our own records, that our troops suffered severely from this disease as early as 1781; and in 1783 there took place one of those periodical pilgrimages of the Hindus to Hurdwar, at the head-water of the Ganges, which takes place every twelve years and which are generally signalised by a great outbreak of cholera.

In 1783 one of those great outbursts took place and I may mention in passing that the two last assemblages, one in 1867, and the other in 1879, were characterised in each instance by a great outbreak of cholera, on almost exactly the same lines in each case. Several other epidemics took place in India in successive years down to the beginning of the nineteenth century, but the one which attracted the most attention was the terrible outbreak which began at Jessore, in Eastern Bengal, and spread over a large tract of Northern India, and in particular caused terrible ravages in the camp of the Marquis of Hastings at Bundelcund, and struck terror into everybody. This epidemic of 1817 impressed people so much that not a few writers spoke of it as the beginning of cholera, but this, as I have shown you, is quite erroneous; on the other hand, people have been

inclined to go a little too far in the other direction ; and some have gone so far as to say, that in the writings of Sydenham we have a description of true cholera existing in London from 1679 to 1682, but further inquiry would seem to show that it was more likely to be a description of the malignant dysentery, which, along with equally malignant ague, used to affect the valley of the Thames so terribly in those days before London was properly drained. The epidemic of 1817 was certainly the first outbreak which caused the matter to be looked into. It continued in 1818, and ravaged Bengal, including Calcutta ; in 1820 it had reached the Punjab ; in 1821, it was in China, and in 1822, in Persia ; and then the influence of this wave of poison seemed more or less to have died out. It was not until 1826 that another great outbreak took place, which is generally looked upon as the starting-point for the first invasion of Europe. The cholera following this outbreak in India itself spread into Kabul and Afghanistan in 1829, and in 1830 it was in Eastern Europe, and committed great ravages there. In 1831 it had spread to Germany, and in the autumn of that year we find the first cases reported in this country in our Eastern ports. In 1832 the disease spread over considerable parts of the United Kingdom and killed a large number of persons.

The number of people who died in that epidemic was estimated at about 21,000 in England and Wales ; 11,000, in Scotland ; 21,000, in Ireland ; making in all 53,000 persons. That is a large number, but its significance is not so great as it looks at first sight. After this wandering of the disease it died out in our Islands, but reappeared on the Continent ; and in 1835, and up to 1839, it spread considerably through the continent of Europe. It, however, died out again, and we have no further record of the disease in Europe, until some nine years later, that is to say, about seven years from the commencement of it. But a considerable epidemic took place in India about 1841 and 1842, and it was probably the course of that epidemic which led to the second invasion of Europe, which began

about 1845 or 1846. It did not reach our Islands until the close of the year 1848; but in 1849 it displayed a virulence and intensity which far exceeded the epidemic of 1831 and 1832, and there died in England and Wales alone as many from cholera as died in the whole United Kingdom from the previous epidemic; and to that we must add the death of something like 29,000 to 30,000 persons, who are registered as having died from diarrhoea, which always accompanies cholera in a very severe degree. This outbreak died out as the former ones did within a certain period, and we heard no more of cholera until 1854, when it again appeared in these Islands. The 1854 epidemic was a much less severe one than the preceding, for only 20,000 deaths occurred in England and Wales as against 53,000 in the previous epidemic. The cholera in 1854 was interesting in another way, because at that time we were at war with Russia, and it attacked our troops in Turkey, and caused a large amount of death. It again broke out in the Crimea at the siege of Sebastopol in the summer of 1855, and caused considerable ravages. It died out, however, as before, and although there were one or two somewhat startling outbreaks from time to time, particularly one which occurred at the Coastguard Station, at Woolstone, in 1859, where a very severe localised outbreak took place, with all the symptoms of cholera, yet there was really no Asiatic cholera, at least what is generally called Asiatic cholera, until a much later period. A very severe epidemic took place in India in 1861 and 1862, and, following this, cholera invaded Europe in 1865, when a few cases occurred on our shores in that year, and in 1866 another epidemic took place. This epidemic was very small compared with many of the former. There were only 14,000 deaths in England and Wales, and something less than 18,000 altogether in the United Kingdom. Cholera again invaded Europe some time later, and in 1873, 1874, and 1875, we had the greater part of the Continent of Europe invaded by it, and very severely handled; but although we were in constant communication

with the continent, and although, undoubtedly, numerous cases of disease were landed in England, yet it never got a foothold here, and we were perfectly free from it then, and have remained so up to this time.

Now, if we compare the character of the disease, and the losses caused by it with those of some other diseases, I think we shall have a clearer view of the significance of an inroad of cholera than we otherwise should. Let us in the first place consider it briefly with reference to the plague in former times. If we recollect that on the last invasion of the plague in this country, in 1665, there died in London alone 68,000 persons, and that the population could not have been much more than half a million at that time, we shall be led to consider that this mortality was far worse than anything which cholera has shown us in our time. The death-rate from the plague at that time amounted to about 1360 for every 10,000 persons, and if we were to apply a similar ratio to London at the present day, we should require to lose in a single year's epidemic more than 500,000 persons by cholera to come up to the same proportion as the plague showed in the year 1665. Now, I think when we consider that the greatest number that died in London at any period was in the epidemic of 1849, and that was 14,500 out of a population of close upon three millions, you will see what a very small affair, after all, cholera is, terrible as the disease may be.

Now, let us come down a little later and compare cholera with a disease which was familiar enough in former days to all medical men, viz., typhus fever. This disease was in this country continuously for a long series of years, and from time to time, under circumstances of great destitution, it broke out in a terribly epidemic form. In the year of the Irish famine there were no less than 300,000 cases of typhus in England, and more than 1,000,000 cases in Ireland, and out of these, I do not exaggerate when I say at least a quarter of a million died—10,000 dying in Liverpool alone. From that we can see that we have been exposed to much greater dangers, as far as the mere

reckoning by numbers of cases and deaths goes, than we have been in cases of cholera. Let us be more particular still, and take the condition of things as it exists at the present day. We have diseases among us that are continually killing people day by day, which are in the long run far more destructive than cholera. Take typhoid fever, or enteric fever, as it is generally called now. That disease kills on an average 8000 persons every year in England alone, and about 11,000 in the United Kingdom, so that it would not take very many years to make up all the losses that cholera has ever inflicted upon us. If we take the group of diseases which are returned under the head of "fevers" in the Registrar General's report, which includes typhus—now happily a small item—typhoid fever, and a non-descript disease called "common continued fever" (which I hope will disappear from our nomenclature by-and-bye, when we have a better diagnosis), we find a much larger number of deaths than are caused by cholera. If we take the year 1854, we find that the number of deaths from those fevers were nearly 19,000 in England and Wales, the deaths from cholera being only 20,000. If we take the year 1866, we find that the deaths from fever in England were 21,000, whereas the deaths from cholera were under 18,000. So that, although we are apt to run into a panic when cholera is mentioned, we sit unfortunately rather too quietly down every day amid dangers which are far more constant and even much more real. The reason no doubt why cholera has been dreaded so much, has been, as I have already said, because it is a stranger to our shores, and not always present; and another thing is, that its nature is so sudden, and death is caused so rapidly, that it naturally does strike terror into all who come across it. It is perhaps one of the most rapid diseases that we are acquainted with, for death very often takes place at the end of a few hours, sometimes at the end of two hours, and in some cases one hour is sufficient from the time cholera declares itself, for death to take place. That is by no means the rule, as there are great variations on this point. There

are also great variations in the amount of mortality from the disease, and variations which not only have to do with different epidemics, but with the course of one epidemic. My own experience of the disease shows that about 63 per cent. of true cholera cases die, that is to say, nearly 2 out of every 3. This, of course, varies very considerably. In some epidemics a great many more die, and in the beginning of epidemics very often 75 per cent., that is to say, 3 out of 4, or 4 out of 5 die, and then the intensity of the disease seems to decrease, and towards the close the majority of those affected recover. With regard to the mortality of the epidemic which is now going on in the South of France, I may say that as far as we can gather from the reports, the disease appears to be of a mild kind, and certainly many more recover than have usually done in the commencement of epidemics in this country or in India.

You may now ask what are the characteristics of this remarkable malady, because unless we know something about the character of the disease as well as the causes of it (if we can find them out), we shall not be in a good position to discover the right preventive measures to use. Now, to describe cholera as it appears, we may say that, in the majority of instances, it is ushered in by a previous stage of diarrhœa. Diarrhœa is generally the premonitory warning stage. This is not always so, for in some very malignant epidemics the patient is struck down, as I have seen myself, without any premonitory symptoms of this kind, and death is very sudden and immediate. But generally there is this premonitory symptom. After a short time, if the disease continues, this is succeeded by enormous bulky watery evacuations, and watery vomiting to a great extent; the patient seems to shrivel up before one's very eyes; the whole water seems to be drained out of his system, and he becomes blue and contracted, and cramped; he is in great agony, the voice sinks to a whisper, and unless this stage is rapidly recovered from, death inevitably ensues. As far as practice has gone we know of

no remedy which is efficacious in this stage ; and we must trust to a great extent to the resisting power of the patient to enable him to pass through it. All we can do is to watch for the symptoms of restoration, and guide them as carefully and judiciously as we can to recovery. When recovery does set in, it is extremely rapid, and the convalescence is also very rapid, because there has been practically no wasting of the body during the disease ; it is chiefly the removal of the watery part of the blood, and the temperature falls many degrees below the normal limit, showing that there is even a suspension of change of tissue going on in the body ; whereas, in fevers proper, the temperature rises often very much above the normal line, showing that there is a rapid burning up of the tissues of the body. The result is, convalescence from fevers proper is always slow and protracted, because the body has a great deal of tissue to make up. Convalescence from cholera is generally rapid and complete, because there is nothing to make up except the water which is very easily absorbed again when the natural functions return. Sometimes, unfortunately, the cholera patient does not get off so well. He may have a stage of re-action, which is known as secondary fever, and unfortunately in some cases he succumbs to this. In some cases, I am sorry to say, this has been due rather to the remedies which have been injudiciously given him than to the effect of the disease itself.

Now, the next question we should ask ourselves is, what is the cause of cholera ? I am sorry I cannot tell you, and I am afraid nobody else can ; but I can tell you the views which are held by many observers, and though they may seem to be somewhat divergent, yet on the whole we are led to the same fundamental principles of prevention, fortunately, whichever view we take. It is the opinion of some men of experience that there is no specific poison, no specific difference between Asiatic cholera and the ordinary cholera which is present in our midst every year. If you take up the Registrar General's report you will find every

year that there are a few hundred deaths, varying in number, which are put down to cholera. This is what is known generally as English or British cholera, or sometimes it is called sporadic cholera. I may here mention that the name "cholera" as applied to the malignant Asiatic disease is really a misnomer, because it comes from two Greek words which mean a flow of bile; now, one important characteristic of true cholera is that the bile ceases to flow. Still it is a name, like another, and, as in many other cases, it is simply taken as the name of a thing without going too deeply into its etymology. As I have said, there are some observers who hold that epidemic cholera is simply an exaggeration of the disease that we are well acquainted with as the common English cholera; and that it is due to some meteoric or other influence—they do not pretend to say what—that it takes on such an appalling form as it does from time to time, after various lapses of time. It certainly is a curious thing, and it may be verified by reference to returns, that there is generally before an invasion of true cholera, a distinct increase in the number of cases referred to diarrhoea and cholera, meaning thereby ordinary cholera. Whether this points to an epidemic influence in the air, or not, is a question which is still being discussed, and which is not likely to be decided for a very long time. There are some other classes of observers who believe that there is a poison which is the cause of cholera—that is to say, that there is a poison which causes this disease, just as they believe there is a poison which causes small-pox or scarlet-fever, or any other of the more familiar zymotic diseases. This poison may be either a chemical substance—that is to say, not a vital living body,—or, which is more probable, a minute living organism such as the *bacillus* which we hear so much of, *bacteria*, *microbes*, and various other names which are given to them. But although many are in accordance on this point that there is an actual poison, they differ as to the way in which the poison is propagated, and as to the way in which it is received and absorbed by man. In the first place I will take a

very powerful body of observers—the school of etiologists, led by the celebrated Dr. von Pettenkofer, of Munich, which has been called the “Localistic” School, a school which attributes more influence to the locality in which the individual is than to any other cause in the development of the poison; but still Professor Pettenkofer and his followers hold that the disease cause is an actual poison conveyed by human intercourse from place to place; that persons must come from an infected spot into the new area. It does not require that the individual himself should be infected with cholera, but he brings attached to himself, in an unknown way at present, a poison. This is deposited on the soil, gets into the soil, and under favouring circumstances of moisture and temperature becomes finally developed into a poison capable of producing disease in those who are susceptible of it. I have said that this school holds that the individual who brings the poison need not be sick of the poison himself, but it goes even further than this, and says the individual who is sick of cholera is only dangerous because he has come from an infected locality, not because he is himself a victim of cholera; and Professor Pettenkofer illustrates this in rather an ingenious way. He says the patient is no doubt suffering from the effects of the cholera poison, but he is suffering just in the same way as a man suffers from the effects of alcohol. If a man takes too much whisky or brandy he gets drunk; but if a friend takes that man home and puts him to bed he does not get drunk from mere contact with his intemperate friend; but if his intemperate friend had come from an infected locality, say a public-house, and carried in his pocket a bottle of whisky, and the friend who took him home were to drink that bottle of whisky, he would become as bad as his friend. This is the view Professor Pettenkofer takes of the question.

Another class of etiologists (and this comprises the majority of those in this country) holds that there is a disease poison, but that it is chiefly to be found in the material ejected from the body of the sick, in the rice-water

stools and the vomit of the sick, and that if these are got rid of thoroughly and completely there is no chance of the poison being propagated ; but that this poison may be propagated in various ways—it may saturate clothing, and after a time produce disease ; or it may pass into our sewers, and through the gases rising in the sewers disease may be conveyed to individuals ; or it may be scattered even on the surface of the ground, on the floors, and over walls, or even on the public roads, and that there it may possibly in course of time cause disease, or it may be taken in with food, if by any misfortune the excreta or vomit of the patient touch the food, or it may get into the water supply, and by drinking the water under those circumstances the disease may be produced.

But there is this difference between it and other diseases, that unlike the poison from small-pox or scarlet-fever it will not directly produce the disease ; and in this it resembles enteric fever, because it is generally believed that the excreta of enteric fever in the fresh state are innocuous, but after they undergo a certain degree of fermentation or preparation that then they are capable of producing disease. In the same way we hold that cholera is hardly in the least infectious directly from person to person, in the same way as enteric fever is very little communicable ; and there is very little danger indeed in attending on a cholera patient if the most ordinary precautions and cleanliness are adopted ; and if you take care to throw off any clothing soiled with the evacuations of the patient, to wash your hands carefully before eating, and various other ordinary precautions, there is but the slightest possible danger in attending on cholera patients.

Now, bearing in mind these different views that are held, you may ask now, how shall we draw from these rules for the prevention of the disease ? We shall do this best by considering under what conditions it best flourishes. We find that the disease flourishes in low-lying, damp, swampy dirty places, and it is exactly in a place of the sort that the disease is what we call endemic, namely, constantly

there. In the Delta of the Ganges and the Bramaputra, in Eastern Bengal, the disease is never absent, and the conditions there for its continuance and propagation are exceedingly favourable ; and, indeed, elevation from the surface of the ground seems to be a very strong element in controlling the amount of cholera. In some very interesting tables prepared many years ago, showing the relative death-rate of different places in the kingdom, it was found that the death-rate diminished pretty nearly as we got up above the level of the sea. This, to a large extent, means as we get up to a position relatively drier and more thoroughly drained. But we cannot depend on any one condition like this alone, because experience has shown that cholera will reach a very high elevation if the necessary insanitary conditions are provided. One would have thought there were no places more likely to be free from cholera than the hill stations in India, but depending too much on the natural salubrity of the place, the occupants of those places neglected every sanitary precaution, and the result has been that cholera has reached those stations, many thousand feet above the level of the sea, and produced a considerable amount of mortality.

Then, again, meteorological conditions are another point. I have already said that cholera does not follow the course of other diseases, and depends not so much on temperature as we have seen that some other diseases do, and on the whole it is rather difficult to say what meteorological conditions do really most favour it. Its epidemics have occurred in summer, in spring, in autumn, and in winter ; in the hottest places on earth and in the coldest ; so that altogether we are thrown back very much on other conditions than meteorological ones. Some persons have asserted, and it is said that Dr. Koch has, that the disease is incompatible with considerable heat and dryness. I do not know whether these are exactly his statements, because they have been greatly altered in the reports which have come to us of them ; but if this is the case, it certainly must have been said without full knowledge of the history of

cholera in India, for the severest time for cholera is generally the month of May and the beginning of June in Calcutta, which is the driest and hottest time of the year; and after that, the month of September when the ground is drying up. It has been said that moisture, showers of rain, for instance, coming after a long dryness, would tend to produce cholera; but this I think, although it may occur as a coincidence, is not consistent with experience in many places. We may certainly safely say that cholera is very often completely swept away by severe rain. I have seen this occur myself in very remarkable instances.

Then, is there any particular kind of locality where the disease is more likely to flourish than others with regard to the nature of the soil? On this point we have some information, but it is still more or less vague. There are certain soils in India, for instance the alluvial soil of Calcutta, and what is called the "cotton soil," which is common in many parts of India, where cholera does seem to flourish more than elsewhere; but there are even in India many places which cholera never attacks at all, and we have some remarkable instances in Europe of the same thing. The city of Lyons, for instance, in France, is by no means a clean city or a particularly dry site, yet it has never been invaded by cholera; and there was seen in the former epidemics the remarkable fact that people were flying both north from Marseilles and south from Paris to Lyons for the purpose of evading the disease, and yet no outbreak whatever took place in Lyons. The same may be said with regard to Birmingham in our own country, which has been remarkably free from cholera. But, everyone who has had experience of this disease knows it attacks places, in what we may call superficially a very capricious way, by which we simply mean that we cannot explain it. No doubt disease follows laws, as the phenomena of heat and light do; but it certainly does seem curious, and in many instances has evaded explanation, that we should find one side of a street attacked, or one corner of a district, or a

house here and a house there, and not be able at all to trace the reason of this.

But if we think for a moment, it is simply defective knowledge on our own part. Let us suppose that we take a smooth surface slightly sloping, and throw a little sand upon it. The sand ought to run away down over the surface entirely evenly throughout ; but to our surprise, at a little distance, we see a portion of the sand sticking here and there, and we wonder why it is so. But there is a very simple explanation : when we come near we find there are one or two drops of moisture on the plate which we had not observed, which hold the sand. Or, again, say we throw some iron filings on a thin board in the same way ; some will remain, on the board, and some will slip off, but we may find the reason was that there was a magnet below one part of the board and not below another. We should call the selection very capricious if we did not know the facts. That is simply the case with us with regard to cholera, and if we knew the facts better we should not be astonished. Still, in some cases the facts are very remarkable. I may instance a case in my own experience in the Crimea. In an oblong valley there were stationed two batteries of artillery side by side, and on the opposite side two regiments of cavalry. I was in medical charge of one battery of artillery, and we had there a case of cholera every day for the first twenty-three or twenty-four days of June, and out of twenty-four cases, twenty-two died. The 10th Hussars, who were on the opposite corner diagonally to the valley, were also severely attacked with cholera. They had come directly from India, and one might have thought, "here is the reason, at any rate, with regard to them : they brought the cholera with them." But the 12th Lancers, who were immediately opposite my battery, had come from India at exactly the same time, and had not a case of cholera amongst them, nor had the battery immediately close by me. We did not know very much about hygiene in those days, and we certainly were quite unable to find any reason why this extraordinary

distribution should take place. A further curious instance was that another battery of artillery arrived from England and took up its quarters at the head of the valley, and as the hospital was not ready to receive any one for a day or two, a patient, suffering merely from a scalded leg, was sent in to mine. Within twenty-four hours he took cholera and died, and he was the only case that died in that battery. I merely mention this as an instance of the remarkable way in which cholera appears to act, for reasons no doubt sufficient enough, if we could only find them out.

There are other conditions which favour it, crowding together for instance, and bad ventilation in houses, by which the disease is propagated very rapidly. I have seen instances of this in India to a very marked degree, and in those circumstances the mere scattering of the population over a wider area is very often efficient in arresting the disease, just as it is with typhus fever in this country. Then, anything that tends to lower the condition of the individual, such as hunger and destitution, general habits of dissipation, undoubtedly lay people open to the disease in a very marked way. Impure water supply is another point of very great importance, I think, in propagating the disease. In speaking of the propagation through the water supply I know I shall be going against a great many of my friends, some of whom I have no doubt are present, but I cannot myself see that we can get rid of the evidence that we have on this point that the water supply is really a powerful means of propagating the disease, and we have a large number of instances of this kind which might be cited at considerable length. One very remarkable instance I may mention is with regard to the experience of Millbank Prison in this metropolis, which up to August, 1854, had suffered both from cholera and enteric fever to a great extent; since that time, although we have had cholera again in the country, there has been no case in the prison, and no case of enteric fever has originated in it. Now, the sole difference is that in 1854 the water supply was changed, and they ceased to draw their supply from

the Thames nearly opposite the prison. The Thames in that part was perhaps then even more foul than it is now, and you can easily understand that any change must have been for the better. There are various other instances which might be cited, but which I have not time for.

From what we have said I should like to draw a conclusion with regard to the prevention of the disease. What can we do, knowing the facts I have very imperfectly brought before you, to prevent the disease coming to us? What can we do in the first place as a Government, or as the Sanitary Authority of a Community? What starts to the minds of most people at once is quarantine, which all the people on the Continent fly to at once. Now what is quarantine? Quarantine is an inheritance, and truly a *damnosa hereditas*, from the Venetian republic, who instituted this system to try and prevent the spread of the Oriental Plague from the Ottoman dominions to themselves. Now this quarantine, as originally arranged, as we may gather from its name, was the detention of any suspected vessel for 40 days; any particular vessel was cut off from all communication directly with any individuals in the country. Fortunately in later and more reasonable times this 40 days has dwindled down to 14, 10, 5, or one—to any period you like—but still the majority of the nations on the Continent believe in this system of quarantine. Now, if we believe that cholera is caused by an actual specific poison that one can deal with individually, and if quarantine could be carried out efficiently and perfectly, it seems reasonable at first sight to think that that is the natural method to adopt. But for those who do not believe that the disease is propagated in this way, or for those who, like Pettenkofer and his school, believe that the disease is brought by well persons as well as sick, quarantine becomes useless. And when we further consider that an efficient quarantine is a blank absolute impossibility, the whole thing at once tumbles to pieces. It is productive of the greatest possible misery to individuals; they are the victims of extortion in every way; they are exposed by

being crowded together to much greater danger of disease than if they were spread about the country ; it is a very serious loss to all shipowners and merchants, and it so disorganises the whole communication between man and man throughout the world, that, even if it were efficient, I should say abolish it altogether. I gave expression to this opinion in an address I delivered a short time ago at Amsterdam, and I am happy to say I carried the vast majority of the audience with me.

Let us just look at the question in this way. This country in 1831 and 1832 had a lingering belief in quarantine, and put it into operation, and it was proved to be perfectly useless, and since that time quarantine has not been resorted to. Instead of that a rigid inspection of vessels takes place, patients actually suffering from disease are kept in a hospital and treated—cured if possible—and those who are quite well are allowed to go away on their ordinary business, their address being taken, so that they may be followed in order to trace any carriage of disease, should there be any ; finally the vessel is fumigated and disinfected to the satisfaction of the officers of health. What has been the result ? We certainly had a very severe epidemic in 1849, the severest we have ever had, but that had nothing to do with quarantine ; the severity of the epidemic was shown by the ravages it committed all over Europe ; it was a much more powerful wave of disease than we ever had before or since. But in the subsequent epidemics of 1854 and 1866 there has been a gradual dwindling down in numbers, until that in 1866 was a very small affair indeed ; and in 1873, as I have already pointed out, although there was cholera on the Continent of Europe, and we were in constant free communication with it, there was not any single trace of epidemic in this country. We may confidently hope that the same rational procedure on our part will be followed by similar happy results.

Now, if we are not to deal with the disease by means of trying to shut it out in this way, what are we to do ? I am happy to say that, however diverse the opinions may be of

etiologists, that is, those who study the remote causes of disease, as to the actual causes of cholera, they are all at one that the first essential is general fundamental hygienic measures in every direction. Even those who do not accept the theory of a disease poison, accept the fact that a want of hygienic conditions is an easy way to propagate or to help the disease to show itself, however it may be caused. Now what are these measures? They should be directed to destroying as far as possible the susceptibility both of the locality and the individual to the disease. If the disease poison is a vital organism that can multiply itself, which seems likely, then the only chance of preventing it doing so is to so render barren or sterilise the soil that it may be planted in as to render its growth and propagation impossible; and the only way to do that is to carry out the fundamental laws of hygiene as rigidly as possible. One of the first things to attend to in a country is general drainage, the drying of the soil as far as possible and keeping it dry. There is no doubt that this has a marked effect not only in restraining cholera, but many other diseases. The London basin is now one of the healthiest places in the world, but in former days—two centuries ago—it was one of the most unhealthy, because the land was swampy and in many other ways in a thoroughly insanitary condition. Then the next point is to attend carefully to the removal and disposal of the excreta, and this must be done in such a way that the whole of the material should be removed from the immediate neighbourhood as fast as possible and carried away to a distance that should render them quite innocuous. After that they should be so disposed of that there may be no chance of their coming back to be a nuisance. This is not the case at present in the Metropolis, although I hope that perhaps by-and-bye a remedy will be found. Any one who has had the disadvantage of sailing on the Thames in these last weeks must have had a very good example of the evils done by pouring crude sewage into a river. A fortnight ago I, in company with some of my fellow Commissioners, was a

victim to the effluvia from this noxious river as it is at present ; and it would have been a very serious matter, probably, if cholera had been actually in the locality. A proper and innocuous method of sewage disposal, therefore, is another general measure which is absolutely essential.

Then we come to the question of water supply. It is the duty of every community to have a water supply as pure as it possibly can be, but unfortunately in many instances this seems to be extremely difficult, and even in towns, for instance in the Metropolis, we have had from time to time outbreaks of disease which I think have been very fairly traced to the impurity of the water supply. This is also the case in country districts where the supply is drawn from wells which, unfortunately, are very often contaminated by the existence of dead wells close by. It is a very unfortunate thing that many of the people in the country, particularly of the lower and working classes, do not seem to be endowed with a very delicate nose or a very delicate sense of taste, because I have seen them drink, perfectly unconcerned, water that would certainly have made almost any person with their common sense of smell or taste, sick. I have even known cases occur where, during an outbreak of fever, carbolic acid had been put down into the dead wells, and within a very short time carbolic acid was tasted in the water of the drinking wells of a row of houses. I went into a house on one occasion, and asked a man to draw a glass of water from his well, which I need hardly say I did not drink myself, but I smelt it, and it smelt strongly of carbolic acid, which had been put down the dead well a short time before. I asked him if he did not smell and taste something wrong with the water. He said, "No, it made very good tea," and that was all he seemed concerned about. If he only drank it as tea, perhaps he might get off pretty well, and perhaps he did not trouble about drinking water under ordinary circumstances, excepting under an alcoholised form, which might perhaps account for his indifference. But suppose we have water that we must drink, and we have reason to suspect that it

is impure, what are we to do with it? There is one simple method that I think we may resort to with perfect efficacy, and that is boil the water. I do not think there is any disease poison whatsoever that will resist the temperature of boiling water. Many people will say, "Oh, but boiled water is nasty to drink," which is quite true, but in a very short time by merely exposing the water to air, or pouring it from one vessel to another, it will absorb the atmospheric air and become just as pleasant to drink as the more sparkling water in its cold state. The use of filters for water is very general, but I am afraid both from the material used, and neglect in cleansing them, they very often do more harm than good. In selecting a filter we should ascertain that it contains substances which are in no way injurious to the water, that it will yield nothing to the water which is likely to propagate organic life, and that the water will stand any amount of keeping afterwards, without going bad. In most cases the filters that are used are made of animal charcoal, and to a large extent do not fulfil these conditions, and although the water comes out clear, and if used immediately may be used without any danger, yet that water, if kept, shows signs of the growth of minute vegetable matter, and consequently you cannot be certain that the germs of disease, if present, are kept back by the filter. If we get materials that will do this from a purely mineral source, then we may depend on the process of filtering; but I would strongly advise that boiling water should be resorted to even if it is afterwards thought necessary to filter it, to remove any suspended matter that may be present. I believe in cases of outbreaks of cholera, for instance among our troops, it would positively pay, even although it was at considerable expense, to supply them on the line of march with distilled water instead of resorting to the ordinary water from canals or elsewhere, and this has been suggested by other officers too. One great advantage of it is this, that you cannot be cheated in this way. The water-carrier may say, I have taken the water from a particular source, and may name it; but if you do not see

him take it—we know that Indians, like other people, are only human, and if it is a very hot day, and it is a good way to go—he would take it from a nearer source. But if it is distilled water, a few drops of nitrate of silver will show if it is pure, for any other water will show distinct signs of the chlorine which is entirely absent from distilled water.

Another point of great importance is the question of what we shall eat or drink. People often ask what diet should be taken? There is one simple answer. If you have been leading a regular and temperate life, keep to it. Every man ought to be observant enough to know if there is any particular thing which disagrees with him. Perhaps that particular thing he likes very much, but he had better not take it when cholera is in the air, or indeed at any other time, but particularly then. One recommendation is frequently given, that is, to eat no fruit or vegetables in cholera times. I remember when I went out to India myself, an old resident advised me soon after I got there, "My dear young friend, do not eat any fruit or vegetables for two years." I took upon myself to disregard that recommendation, and I ate fruit and vegetables, being fond of both, and I do not think I suffered very much from it. It is quite true that if you indulge in unripe fruit, or in over-ripe, decayed fruit, you will very likely suffer from it, and in the same way if you eat inordinately of raw vegetables. I do not recommend you to eat raw turnip for instance; but it would not only be unnecessary to give up fruit and vegetables, but positively hurtful, because those articles of diet are necessary for the complete health of the individual, to carry on digestion, and if they are given up they will lead infallibly in course of time to a more or less marked series of symptoms, which we recognise as scorbutic or scurvy symptoms, and that scorbutic condition would be about the best condition you could possibly select, if you want to get an attack of cholera.

I need hardly say that as regards alcoholic stimulants, any excess in the use of these is distinctly hurtful, and that

to resort to brandy copiously, as used to be the plan in former epidemics as a prophylactic, is a decided mistake, and is more likely to lead to bad results than otherwise. At the same time I do not by any means counsel those who have been in the habit of taking in moderation wine, beer, or brandy, to give it up if they find it *agréé* with them, and the same with regard to the moderate use of tobacco.

Now, there is one other point of importance, and that is the question of disinfection, about which we hear a great deal. This use of disinfectants has become more or less a fetish in this country. People believe in disinfectants to a great extent, much more than they believe in thoroughly proper hygienic measures. Now, disinfectants are very good when properly used, and sufficiently used at the proper time and place, but the use in most cases is perfectly illusory, and merely a cloak for dirt and neglect, and I think in a large number of instances they do far more harm than good. If we have a system of drains properly laid, properly flushed, and properly ventilated, we require no disinfectants, and if the sewage in the end is properly disposed of, then no nuisance can arise; but in too many instances the drains are badly laid and badly ventilated, and become drains of deposit and simply stink; then a rush is made to put in disinfectants, and those are put into the drains, and not only that, they are put in recklessly into closets, and the results are most serious. Some of my engineering friends have remarked to me more than once that they wish disinfectants had never been invented, and I have sometimes been inclined to agree with them, because the idea of putting any quantity of powders into pipes and closets is a most irrational one—it inevitably causes obstruction sooner or later, and the evil produced is much greater than that intended to be avoided. Then, again, the majority of substances which are supplied as disinfectants are simply deodorants. A true disinfectant is that which will destroy the disease poison. Now, there are few indeed that will do that; and when you require them to do that, they should be used lavishly in an enormously

large quantity as compared with what is generally done. Many are deodorants—that is to say, they destroy the odour and break it up into other less offensive things, or they mask the odour, as carbolic acid, for instance, masks various odours without destroying them. That is a very different thing from disinfection. And one absurd thing is to attempt to disinfect rooms when people are in them; and we have the ridiculous and humiliating spectacle of people being disinfected in France and Italy at the Railway Station by being put into a room, a vapouriser set going, and those wretched people having to sit breathing the fumes of chlorine, and probably getting bad bronchitis, without being disinfected after all. All this is perfectly ridiculous. If you set free certain disinfecting vapours, chlorine, or whatever it may be, in rooms with people in them, you may do something in killing the smell and making the atmosphere more agreeable, but as to destroying disease, if it is in the atmosphere, you may as well have left it alone. There is only one thorough disinfectant, and that is fire. If we are dealing with refuse material, as for instance that terrible danger, the dust heap, by burning we get rid of all difficulty and danger; or if we take clothing or bedding and subject them to heat either by boiling or by heating them in a chamber by dry heat, or, what is considered much better, by compressed steam, then we can disinfect them thoroughly and perfectly. Again, if we wish to disinfect a house, a room, or a shop, we should close up all the windows and doors and then set going either burning sulphur or nitrous acid or chlorine, or any other substance we have confidence in, and leave the place closed up and allow the air to become perfectly poisonous, perfectly irrespirable. Nothing short of this is of any use at all to destroy those minute forms of life which are believed to be at least analogous with those which are considered disease poisons.

Before leaving the question of disinfection I may refer to the arrangement of closets in houses, and as I have mentioned the danger arising from the reckless use of

disinfectants, I would point out also the great danger arising in almost all houses, at any rate in those which are not exceedingly modern, from the form of closet which exists, known as the old pan closet with a "D" trap. This is the most dangerous, as well as being the most offensive form that can be presented. The "D" trap is a deposit of filth that is never cleaned, that is from its very nature impossible to be self-cleaning, and that I am sure might be credited with a great deal more disease and death than we have the smallest possible idea of. If I had my will, I would instantly cause these closets to be abolished in every house in the kingdom, and I strongly advise those who value their health, especially in view of a possible invasion of cholera, to get rid of them as soon as possible. What is known in modern times as the valve closet is an excellent form for those who do not mind the expense, but a much simpler form is the hopper, or wash-out closet with a siphon trap; it is hygienically better, and has the great merit of being very much cheaper. Then with a good flush cistern to carry away everything out of the house at once, there cannot possibly be a nuisance.

There is one other point I may refer to, and that is the personal precautions to be taken in case of an invasion of cholera. We may not have it in this country—I hope not—but at the same time it is quite possible. But, if there is anything that can be said generally of the disease, it is, with some exceptions I have already mentioned, that a slight diarrhœa is usually a premonitory symptom of cholera. Now this ought to be attended to immediately, and medical assistance ought to be sought for at once. If there is any unavoidable delay in getting medical aid, steps ought to be taken to arrest the malady. A very simple method is a few drops of chlorodyne taken either in water alone, or with a little brandy added, which will very often arrest incipient diarrhœa. This has to be the more carefully attended to because it is so painless and gives so little actual discomfort that it is apt to be neglected and thought little of. In the public service, especially in India, where cholera breaks out

from time to time, one of the precautions taken by the medical and regimental authorities is to station a trustworthy non-commissioned officer to watch if any of the men go frequently to the latrines, and they insist on their immediately receiving remedies to arrest it, as being the best and surest means of stopping the disease. This is a point which I think certainly ought to be attended to, and medical assistance should be sought as rapidly as can be.

I find I have passed the usual time, but the subject is rather a large one; and I may say this, that looking at what has been done in this country in the way of improved sanitation I think we have good reason to be gratified with the results. The towns which have adopted good sanitary laws have been very little visited by successive epidemics of cholera; and in a pamphlet which my friend Dr. Buchanan has put together, reprinting some earlier reports on the subject, some very interesting information will be found. It is entitled, "Reprint from Reports of Medical Department, with reference to Cholera;" price 4d. We have here a table which shows the results in many cases of hygienic measures. For instance, one town which had a death rate of 205 in 10,000 of the population in 1848 and 1849, passed through the next two epidemics after the hygienic improvements were carried out, without any deaths at all. Take again the city of Bristol; it is even perhaps more remarkable, as being a very large place. In 1848 and 1849 it lost 82 per 10,000; but great improvements were made between that and 1854, and then it only lost 11 in 10,000; and in 1866, the late Dr. Budd, one of the greatest authorities on the subject, with other authorities of the city of Bristol, organised arrangements for taking charge of cases that broke out, and isolating them and dealing with them immediately, and carrying out proper principles of disinfection and other sanitary measures, with the result that the rate of death in 1866 was only $1\frac{1}{2}$ in 10,000—in fact, the cholera was practically extinguished.

Now, the conclusion I draw from what I have said is this: that the only fundamental way of arresting cholera,

and in doing that we resist many other diseases—perhaps most other diseases—is to follow out the true principles of sanitation in every particular ; to render the soil practically barren for the seeds of disease to grow in ; secondly, although we have our short-comings still, and there is a vast deal to be done in the way of sanitation, we have progressed so far, and have matters so far organised, that although “one should never prophesy unless one knows,” as the American humorist says, yet I feel pretty confident that if the cholera does reach our shores, it will find no foothold here. It may spread to a slight extent, but I think we may look confidently forward to an immunity from the disease such as we had in the last great epidemic in Europe in 1873. I do not say we shall not get it, but we have good reason to hope we shall escape; and if we do so, I think it will be mainly, I do not say entirely, due to the improvement in sanitation which has taken place, especially in our large centres of population in these recent years. But confidence that we may escape the disease ought not to make us relax in any way our sanitary energies. On the contrary, we ought to redouble them, in order to make assurance doubly sure ; and not for that end alone, but in order also to diminish the intensity of those endemics which are always with us, and which I have shown you already, are far more dangerous and fatal to the community than all the cholera epidemics we have had put together.

Upon the invitation of the chairman, Mr. EDWIN CHADWICK, C.B., gave some particulars of the action taken by the General Board of Health, at the time he was there, in a former epidemic of cholera. With regard to the efficacy of quarantine, his opinion was they might just as well have a quarantine against the east wind. Cholera came like a cloud and affected all life. The French were blamed for flying from Toulon, and no doubt panic added to the evil, but it was proved in the former epidemic that bivouacking outside the town was of great value. He recollected people borrowing tents from the Tower and camping out, when the

disease began to decrease ; but after a time people got tired of this kind of life, and returned home, and in many cases fell victims to the malady. Some who were attacked returned to the tents and immediately recovered. Therefore, upon the whole, he thought the system of camping-out was, as far as it went, very effective, and that the French were right, provided they did this without creating a panic. Another remarkable effect found in the former epidemic was, that all water supplies became affected, more especially in Scotland, and the people got the notion that their wells had been poisoned. They also found that premonitory symptoms generally denoted the approach of cholera, and consequently a house to house visitation was instituted ; so admirably did this plan work, that if any sudden rise in death-rate took place in any particular town the Board of Health at once knew that their recommendations were not being properly carried out, and they took immediate steps to see that they were, with the result that the disease was soon mastered. Sanitation was the greatest enemy of cholera, and he recommended the constant washing of the body. It was a fact that pigs that were washed put on more flesh than pigs that were not ; and the Irish were now waking up to this, and washing their pigs, though he was sorry to say they forgot to wash their children.

The CHAIRMAN proposed a vote of thanks to Professor de Chaumont, which was carried unanimously.

THE HISTORY AND RESULTS
OF A
DISPENSARY FOR SICK CHILDREN
THREATENED WITH CHRONIC DISEASE.

BY
DR. J. GIBERT,
Of Havre.

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A LECTURE ON THE HISTORY AND
RESULTS OF A DISPENSARY FOR
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Mr. SAMUEL MORLEY, M.P., in the Chair.

THE CHAIRMAN said he had very gladly assented to the request that he would preside on this occasion, coming simply to listen, and not to speak. He found the lecture was really on a new mode of public charity carried out in Havre with regard to the children of the poor suffering from chronic ailments. Dr. Gibert had been sent by the French Government to give evidence before a certain department of the Health Exhibition, and he had been requested to give information with reference to the establishment of a dispensary in Havre, which had been so successful that it had been followed by the establishment of a second, as having a most important bearing, not only on the children of the poor, but on the poor themselves in certain cases. He confessed that he came with a very strong desire to hear of some new and better mode of dealing with the poor generally than was adopted in this country, for he was exceedingly dissatisfied with our mode of dealing with that question. However, this particular

subject was one of deep interest, and he would now call on Mr. Hodgson Pratt, who had kindly undertaken to read the address.

Dr. Gibert thanked Mr. Morley for taking the chair, and said he should be glad to add a few words in explanation of details after the paper had been read, but he must ask leave to do so in French, as he felt some difficulty in speaking English.

Mr. HODGSON PRATT then read in English the principal portions of the following lecture, which had been written by Dr. Gibert :—

LECTURE.

THE social problem of our duty to the poor and suffering is one which it is impossible to over-estimate. Everywhere in Europe the municipal councils of both large and small towns have to contend with the difficulty of meeting the enormous expenses of public assistance. Truly it is a beautiful sight to see charity, that Christian virtue, unknown to the ancient world, trying to combat and vanquish the miseries of man ; to see in London, for example, voluntary subscriptions creating and sustaining hundreds of hospitals. Regarding the question, however, from the social point of view, there are many complex problems.

Let us enter into some necessary details, that we may better explain ourselves.

Natural weakness, passion and disease, have at all times created a host of sufferers, who must be either abandoned, as in savage nations, or succoured, cared for and cured, as is done in well-organised societies.

The hospital has become the palace of the unfortunate struck down in the battle of life, and everywhere it has been attempted to give to this palace a luxury of construction, of architecture, and of comfort, frequently useless, which has in some manner appeased the consciences of the rich. It was thus that the Emperor Napoleon III., as a compensation for the expense of building the Opera,

constructed the new Hôtel Dieu at a cost of £1,600,000 ; that is to say, a capital with which could have been erected at least ten hospitals.

The number of hospitals has multiplied in a proportion nearly equivalent to the misery to be relieved ; and the cost involved in the case of large cities, such as London and Paris, is truly appalling.

In France, the hospitals have been ameliorated very much, but they are still what I call prison-hospitals. The invalid has his number, and he lives separated from his family, the members of which are only admitted to see him twice a week, and very exceptionally on other days. In England the hospital has become another home ; and it is not a slight surprise for a Frenchman to see in the common room a sick man offering tea to his friends or the members of his family. The English, in thus transforming the ward of an hospital, have tried to render it as attractive as possible, in order that any one may go there—either the unfortunate, deprived of all family connections and of his worldly goods ; or the man who, not being able to pay at his house the fee of a celebrated surgeon, seeks in an hospital what his purse cannot give him at home.

To render the hospital attractive, commodious, full of comfort, and often of luxury, as at St. Thomas's ; to multiply the number of hospitals (for which London is so honourably remarkable), is to act with a vigour of personal sacrifice which is, I believe, a prominent characteristic of the English nation, and which does them the greatest honour.

But is the hospital the real social solution of the problem of disease ? I think no one can maintain this theory. It was early understood in England (long before it was on the Continent) that out-door treatment and that given at the home must be resorted to as much as possible. In 1786 the Academy of Science in Paris sent delegates to England to study the organisation of out-patients, which was completely unknown in France. At this time, London had a general dispensary which excited the admiration of the Parisian delegates. Their Report received no con-

sideration, the Revolution having given France something else to think about. But the Report was not lost, for in 1801 a great minister, Count Chaptal, established, through a valuable circular sent to all the prefects of the Empire, the introduction of external consultations, with a thoroughly complete organisation for treatment at the home. I cite the following from the circular:—"The first duty of the administrator, after having learned the nature of the disease and the condition of the sufferer, is to ascertain whether he could be properly nursed at home. This system of out-door help, which has resulted in such great benefit everywhere, represents, moreover, great economy for the hospitals. If we add to this advantage the consolation which is felt by parents when nursed in their own beds by their children, it is obvious that the hospitals should receive only those poor creatures who have neither home nor relatives."

Out-door treatment was not really organised in Paris until 1853, and the results, from a social point of view, are worth recording.

From 1854 to 1877 the number of patients treated at their homes was a million and a quarter, representing seventeen million days of sickness which, at the cost per day at the hospital, would mean a sum of about one million six hundred thousand pounds; whereas the actual expense was only about seven hundred thousand pounds. Thus the result in favour of out-door treatment was a saving of nine hundred thousand pounds. Add this very important fact that the average duration of an illness treated at the hospital is twenty-three days, while it is only fifteen days when treated at home.

In England, the necessity of putting a curb on hospital expenses has been so well understood that, from year to year, you have developed the treatment of out-door patients. However, I believe that in England no more than in France is it yet understood to what a degree the hospital, from a social and moral point of view, is a great and costly mistake.

The hospital ought to be an exceptional institution, becoming so more and more from year to year ; instead of which we see the number of hospitals always on the increase.

However great the care taken in furnishing the wards of a hospital ; however great the liberty accorded for visits of relatives, the fact remains that the sick are separated from those who belong to them ; that they are given up to the hands of strangers ; that the duty of nursing and of learning to nurse their own sick is ignored ; and that thus, beside the enormous charge entailed on the community, the system involves neglect of sacred duties.

If these principles are true, if it be the duty of the family to nurse its sick, if the hospital should be the exception, what must be done so that these principles may be a mere theory ?

We must place help within easy and immediate reach of the family.

As to the rich, there is no question : they choose their own doctor, and stay at home.

But as to the day-labourer, who cannot afford to call in the doctor, what is to be done ? In France, as in England, workmen unite in societies, called mutual-help societies, which make a contract with the doctor who attends them ; most frequently for a nominal fee. But this arrangement, excellent in cases of dangerous illness, rapidly terminating in death or cure, is valueless in surgical or chronic ones, and nothing remains for the workman but to go to the hospital.

How shall the problem be solved ? It appears to me that we should obtain important results if we could have everywhere establishments open all day, where the doctor would have at hand a complete therapeutic arsenal, and where the sick would find immediate and intelligent help and care at any hour. Such an establishment would also facilitate treatment at home and guarantee the hospital against the admission of persons having no claim.

In order to specialise this idea for children, from birth to

the age of fifteen,—since it is in the first years of life that the death-rate is highest,—I founded in Havre in 1875 a dispensary for suffering children, framed on the general plan of all English dispensaries, but more developed, and more perfect, if I may say so, and which, in nine years, has fully realised the hopes I entertained. The dispensary, of which you will find a model in the Exhibition, was simply a photographer's studio, which I purchased and suitably transformed.

A dispensary thus conceived, with such complete and varied resources, is able to render all the services which one ought to expect of such an establishment. My experience of nine years has shown that there is no infantile disease that cannot be carefully attended to in this establishment, and most frequently cured; for, to cure the maladies of children, one must especially have perseverance and time. Let us see, now, what have been the results obtained.

Let me remark, first, that all the diseases of children are represented in the Reports of this Dispensary.

Acute maladies often terminate by death for want of timely care. When the mother of a family knows that she has, near her, every day, a doctor to guide her, she at once consults him, and brings her child to him. Bronchitis, pneumonia, enteritis, treated in time, give a great number of successful results. Doubtless, a single visit to the dispensary does not suffice, and in the cases of which I speak, the mother could not, without danger, bring her child every day, but she comes and describes the condition of the patient, and whenever it is necessary, the child is visited till recovery is secured.

In the numerous cases of enteritis (which in Havre constitutes the most terrible and active cause of mortality among children) it suffices to change the regimen of the child, in order to obtain in very few hours an amelioration of the alarming symptoms. To oblige the mother to suppress a vicious form of alimentation, to show her that, with lightly alcoholized fresh water, she does more good

than with all kinds of pap, is to save from certain death a great number of children who succumb because of ignorant practices.

It is, above all, in cases of constitutional disease that the Dispensary is useful.

Let us take, first, skin diseases, which seem to be the necessary adjunct of poverty and over-crowded lodgings. Scanty accommodation and insufficient cleanliness suffice to produce a crowd of parasitical affections of the skin, which, little by little, destroy the health of the child, and make it either lymphatic, herpetic, scorbutic, or scrofulous.

Now, the dispensary serves to correct all this. The number of skin diseases among the children of Havre used to be considerable. In the first year of this dispensary, out of five hundred and seventy children, more than three hundred were affected; while the last report shows that out of two thousand children coming under treatment there were not more than two hundred and fifty cutaneous affections. One may legitimately conclude that the creation of the dispensary has sufficed to drive from the town of Havre a great number of cases of this class.

We know now, thanks to the progress of medicine, that most skin diseases, instead of being impurities of the blood (hereditary or constitutional), are caused by parasites, and consequently are easily cured. Scurvy, such as tonsure herpes, favus, alopecia, circinatus and herpes, including *teigne*, called in England scaldhead, are cured without exception, provided that the treatment is followed up with sufficient perseverance. To cure these terrible diseases is to insure the healthy state of a whole population, for their contagion would pass from the children to the adults.

The one precaution to take with children thus contaminated is that they should not associate with other children. Nothing is easier than to bandage, bathe and shave the head at particular hours, so as to suppress the danger of infection.

We come next, in order of importance, to the constitu-

tional maladies which necessitate a profound study of each case and a prolonged treatment.

It is for these cases that the hospital appears to be a necessity, and yet I can say, with certitude, and after a long experience, that in these cases especially the dispensary is far superior to the hospital.

Let us take, as an example, one of the most obstinate, and most to be feared diseases of infancy, coxalgy (hip-joint disease), so well mastered by your illustrious surgeon, Sir Benjamin Brodie. We treat at Havre every year many cases of coxalgy, and we have at our disposal the excellent splints of Bonnet of Lyon, and the new apparatus of Sayre of New York.

When it is necessary to straighten the limb of the child and to put it in a satisfactory condition, we submit the child to the influence of chloroform, we straighten the limb, and apply "*pointes de feu*." Splints are applied, and the child is carried home, either in its mother's arms or in a cab. From time to time, say every fifteen days, the mother brings the child, and in complicated cases of abcess, purulent fusée, we perform at our dispensary the necessary operations, or we go to the patient's home if it be found indispensable.

What I say of coxalgy, I say also of all white swellings, and of all chronic arthritis. It is precisely for these diseases that the dispensary appears to me to render more service than the hospital. In fact, when arthritis is cured, and the re-establishment of movements is all that is needed, then simple douches, vapour douches, massage, and electricity are the active agents for the restoration of health. The dispensary every year saves scores of children attacked by chronic arthritis who would remain crippled except for the care which they receive there; and white swellings, so frequent among children, have not been unsuccessfully treated when the parents have brought them soon after the first appearance of the disease, and persevered in the remedies prescribed.

To chronic affections of the frame, add bodily deformities, produced by various causes :

Club feet necessitating the cutting of the tendon achillis and a retentive apparatus.

Flat feet produced among many children through their own weight being too much for them to carry ; flat feet complicated with valgus and consecutive deformities of the pelvis, which is strongly arched.

Skoliosis, so frequent among young girls who are seated in a bad attitude while writing ; or skoliosis by the fact of feebleness of constitution at the moment when growth is most active.

Crooked legs, whether from the rachitis of childhood or from any other cause. All these diseases claim treatment by hydrotherapy, gymnastics, massage, and electricity.

Where will these children of the poorer class find the enlightened and diligent care so necessary to them ? Is it in hospitals ? Yes, for some of the most miserable cases, but for the greater number I must say that children thus attacked are not cared for anywhere, and I think it is the same in England as in France. I believe it all the more readily that not a year passes that I have not to treat children coming from England, who have received until then no thorough attendance.

It would be difficult to pass in review all the maladies treated at Havre ; but there is one that I cannot pass over in silence, so much social interest does it present.

The number of children who from craniological malformations suffer from serious diseases of the nervous system is considerable in every country. It seldom happens but that epilepsy of infancy is due to a vicious confirmation of the cranium ; and after repeated epileptic convulsions the intelligence is weaker and often dies out entirely. A great number of idiots have first been epileptics with the cranium ill-formed and the brain unable to develop normally. These malformations of the cranium are due, such at least is my conviction, to rachitis, which has itself been transmitted to the children by parents whose blood is tainted by a specific vice. Instead of abandoning these unfortunate beings to themselves, they must be cared for,

with the aid of their parents, during long years. It is only when all has been unsuccessfully tried, and when it is thoroughly demonstrated that the epileptic or idiot is incurable, that we must have recourse to the special asylums which are destined to receive these sad wrecks of civilization.

What care can we give them?

I affirm now, after nine years' experience, that infantile epilepsy can be often cured, and amelioration is nearly always obtainable. But in order to get at these results, a well supplied dispensary supplemented by the perseverance of the parents, will alone obtain results.

Permit me to relate to you here the history of a family, the children of which successively applied for treatment at the dispensary.

The father is a healthy workman, the mother equally so, presenting, however, specific dental ulcerations which have been described for the first time by Hutchinson. There are five children; the eldest, fifteen years old, had convulsions when it was an infant, but it (without being specially cared for) surmounted the morbid tendency which has attacked them all. The second, eleven years of age, is epileptic and idiotic, but with that kind of idiocy which has not extinguished all intelligence. Unfortunately, he is mischievous, and has none but bad instincts. He torments animals, and delights in breaking and destroying every thing that comes in his way. When I saw him for the first time, two years ago, he had epileptic fits every day. The first thing which struck me was the condition of his head, which was enormous. The circumference of the cranium was fifty-six centimetres; the sutures of the cranium presented everywhere Synostosis, that is to say, certain signs of craniological Rachitis. This child has been for eighteen months under treatment at the dispensary, and this is the result, which is due to internal medication and cold douches, taken regularly:—Epilepsy no longer exists, or to be more exact, he has had no fits for six months. The bad instincts have disappeared, sensi-

bility exists, and on the twenty-first of last May, for the first time in his life, the child wept real tears of grief. His intelligence makes every day such progress that his parents are able to send him to school, and he is beginning to learn to read. A thing still more important, the diameter of the cranium has decreased by two centimetres.

The third boy, aged five years, is not idiotic, but he has been repeatedly attacked by convulsions, and is on the high road to epilepsy. The same treatment will be applied to him, and we shall save him certainly from idiotcy.

Now, without the dispensary, none of these results would have been obtained. The parents, much attached to their children, would never have allowed themselves to be separated from them, and the whole of the family would have suffered from a heavy burden, which would afterwards fall upon the community.

I could multiply similar instances, especially if I spoke to you of those miserable little beings who, after terrible attacks of acute myelitis, have had atrophic paralysis, after which a whole limb, arm or leg, becomes dead or useless. For such children the future can bring nothing but endless misery, for they cannot learn any trade.

The dispensary saves them, thanks to electricity and hydrotherapy. Persevered in during several years, we arrive at reconstituting, if not all the muscles, at least muscular fascies, which permit these unfortunates to use their limbs without the help of crutches or artificial limbs.

Thanks to the progress of modern surgery, and especially to the illustrious surgeon, Lister, who is a benefactor to humanity,—it is possible to perform, in an establishment small as that before you, operations of the most varied kind, and some of them of the most complicated nature.

We have, indeed, successfully performed several amputations of the arm, the fore-arm, the leg.

The child operated on at the dispensary remains there for several hours until the effect of the chloroform has passed away, after which he is taken home in a carriage, or in a litter. Nothing is easier now with bandaging

occlusion des plaies. The truth is, that during our nine years' experience, we have not lost a single patient operated upon, and you will agree with me that the parents who have had the happiness of being able to nurse their children, and who have seen all that we have done for them, have also learned much ; first, as to the claims of hygiene, and, secondly, its close relation to morality. Separation of parents and children should be considered, according to my idea, as the saddest of social necessities.

I take another example from among the last operations performed this year. It relates to a little girl seven years old, the daughter of a baker who barely gains his living ; she had a severe attack of measles ; she lost by gangrene the two maxillary jaw-bones, and soon a contraction of the right masseter, with a cicatrical freemun, closed the mouth so hermetically that it was only possible to administer nourishment to the child by means of injecting food along the cheeks into the pharynx. It was necessary to render the lower jaw free. By means of a chain-saw, after making an incision in the tissues, we separated this bone, the level of the right masseter, at its front edge. This operation, always delicate and difficult, has succeeded perfectly, and now the child eats like anyone else.

I could easily multiply these examples, and pass in review before you all the diseases of the eye, the nose, the ears, which require treatment and special apparatus, but I really fear to fatigue you.

I prefer to study with you another side of the great hygienic problem that the Dispensary serves to solve. *I wish to speak of the medical inspection of schools and of its consequences.*

In France, medical inspection of schools is made in very few towns ; it is, however, the indispensable complement of compulsory education. In fact, schools easily become hotbeds of infection, and soon propagate diseases outside in the families. It is impossible to organise effectual sanitary institutions without organising the thorough inspection of schools.

On the Continent, it is the Bureau d'Hygiène of Brussels which realises most perfectly this inspection. In England the inspection exists, but I am ignorant as to its mode of working, and I have some reasons to doubt itsefficiency.

At the Health Congress of Turin, four years ago, the following question was proposed by Mr. Felix, of Bucharest : What must we do with children who are turned out of school? Take, for example, those who are attacked by parasitical diseases of the skin, such as the itch, or any other of the common scurfs, the farvus, tonsuring herpes, alopecia, circinné herpes. What is to become of these children? You oblige the parents to have them cured. But how can they be cared for? Where are they to be cured? At the hospital? But a great number of parents would refuse to send their little ones there ; and there must be a law to oblige them, a law which would be singularly open to criticism. At home by a private doctor? But the treatment of skin diseases is often long, expensive—it necessitates the use of baths, which are always expensive—and the greater number of parents of the working class have certainly not the means of obtaining such treatment. It therefore results that the greater number of children rejected from the school by the medical inspector become little scourges, spreading in their families the germs of their diseases. This state of things is to be seen in France, and it is therefore that they have founded at Paris, and in some other large towns, hospitals for the treatment of scorbutic out-patients. But the resources available in large towns are not to be had in smaller ones, nor in villages. It thus results that in France we have 12,000 *teigne* patients who reach the age of military service without being cured. Well, the dispensary for sick children easily solves this difficulty : it could be established everywhere without much expense, and everywhere the contagious diseases of children could be attended to and cured. We have already said that since the opening of the dispensary in the Rue St. Quentin, a few years ago, a very great number of chronic and parasitical diseases of the skin have

disappeared, and every day children sent away from the public schools by the inspecting doctor, come to the dispensary to seek for cure. In England compulsory education, as we have it in France, has existed for a few years only, but even then the difficulty which I point out, and which was referred to at Turin, must exist. I do not push the point any further, but reserve to myself the right of giving other explanations if occasion should arise.

From the administrative point of view, I shall doubtless here be asked how and with what funds the dispensary I founded is carried on. As it is quite a novel undertaking, I wished to run all the risks myself, and took the responsibility of finding the necessary money, which I do not think could so easily be found everywhere. First, I addressed myself to friends or wealthy patients, who have each kindly subscribed a small annual sum, but in France they have not, as in England, the habit of setting aside a certain sum out of their incomes for social or religious utility. In France everything is expected from the State, and the poor man considers the right to relief as his property. I have not come here to discuss the value of this principle, the morality of which I very much doubt, but which I accept as a simple fact. The result is that it is very rare to see in France works of charity supported for any length of time by voluntary subscriptions. People get tired of giving, then they give less, and finish by giving nothing at all. That is why I thought it necessary to find other resources besides voluntary contributions. I opened part of the establishment for the well-to-do, who wished for gymnastics and the use of the hydro-therapeutic room. This plan was very successful, and I have been able in this manner, not only to meet the current expenses, but also to *amortise* (pay off) the capital sunk, in such a manner that now the annual cost and the capital have been supplied, and I have no further need of subscriptions. Those who still continue to send me their offerings, enable me to form a reserve fund to pay for the appliances for poor cripples which are always so expensive.

I now come to the most interesting part—from a social

point of view—of this new means of relief and assistance. The net cost is remarkably low when compared with that of the hospitals. In 1882 we treated 2153 different ailments, to wit :

Medical ailments	1204
Surgical	455
Specific (Syphilitic)	67
Cutaneous	333
Minor, or of no importance	94
	2153

The cost has been :—

	£	s.	d.
Medicines, drugs	48	2	2
Appliances, sundries, &c.	52	12	0
House surgeon	22	0	0
Directrice	84	0	0
Stoker (Bath Heater)	48	0	0
Coal, gas, water	46	14	0
Rates and taxes	9	16	0
Interest on	6	0	0
	317	4	2

This sum of 317*l.* 4*s.* 2*d.* is at the rate of about 3*s.* 6*d.* per child per annum ; and, taking it as absolutely exact that each child comes to us from fifteen to twenty times, the cost is 2*d.* or 2½*d.* per child per day. Now I beg of you to notice that this sum of 317*l.* odd comprises the medicines and appliances, which amount to more than 60*l.* The following medical operations are comprised in this outlay :—

Operations.	Number.
Medicated baths	4820
Electric applications	1200
Douches	2000
Steam douches	90
Nasal	900
Shampooing	180
Steam inhalations	40
Pulverisation of medicated liquids	1600
Hot air baths	38
Sundry bandages	3000
	13,868

Thus we have a total of nearly 14,000 medicinal operations. These figures represent the work of the *personnel* of the establishment, to which must be added the work not only of the doctor, but of several doctors who are good enough to help me gratuitously in this work of humanity.

We must, lastly, add the considerable number of minor and major operations which are performed every Thursday, and of which we have, unfortunately, not kept an exact account. If you will recapitulate the essential points, you will see that for a very small sum (say, 5 francs per annum per child) you obtain results far out of proportion to the expense incurred.

Suppose, on the other hand, that all these children, to the number of 2000, had to be kept in the hospital, it would have cost at least ten times as much, even supposing that the hospital possessed all the therapeutic means of the varied character found at the dispensary.

I have, then, the right to conclude that this mode of relief is greatly preferable to the hospital, for the following reasons :—

1. It does not separate the child from the family.
2. It obliges the parents to learn what kind of care to bestow on their children.
3. It combats every day effectively popular prejudices.
4. It is very much cheaper.

It was in 1875 that the dispensary at Havre was established. In the same year Dr. Pini of Milano opened a dispensary in that city, nearly on the same basis as ours, but only for rickets, or rachitis. From that time he has transformed his establishment, which is now unmistakably a hospital, but with the outdoor treatment much more developed, and more than enough of all modern appliances.

Adjoining it there is a school for children, who spend all the day at that establishment, and at evening-time they are taken home by their parents.

Since 1875 other dispensaries, similar to the one of Hâvre just noticed, have been established.

The first was at Clermont-Ferrand, by the initiative of

Dr. Hospital. From the first year the results have confirmed what I foretold they would be. The second was at Paris, in "Rue de Crimée," La Vilette, under the supervision of the Philanthropic Society, which you know resembles in many respects the provident societies of England. The results have been so encouraging that it has been decided to renew the experiment in each district of Paris. Three hundred and forty-four children were presented for treatment at this dispensary.

The third has been established at Rouen, in much the same way as at Clermont-Ferrand. It was organised by the municipality ; and from the first year the results have been remarkable, so that the objection formerly made against the Havre Dispensary, "that it was an undertaking kept up by the personal and supposed influence of a special practitioner," is quite false. Everywhere, one finds doctors capable of treating children, and everywhere one can obtain, from the outset, the results I have shown you.

At Rouen the dispensary is opened to adults as well as to children.

Finally, to finish with France—for I always consider Mulhouse as a French town—I will just say that Mr. Engel Dollfus has opened at Mulhouse an immense dispensary, which in the first six months afforded treatment to 490 children. They will arrive at more than a thousand in the first year.

Out of France, I must draw your attention first to St. Petersburg, which has organised, as annexes to three large hospitals, three dispensaries, admirably supplied with medical appliances. In 1881, fifty thousand children were treated in these several establishments—ten thousand from their birth to the age of six months, sixteen thousand till they had reached their first year, and twenty-four thousand children of all ages.

Dr. Rauchfuss, the devoted and intelligent founder of these establishments, writes to me that, with such astounding results, the great importance of dispensaries will be

patent to every one as a means of rescuing young children whose tender years are menaced, especially during the first year.

The eminent services, adds Dr. Rauchfuss, which the dispensary for children is called upon to render, depend only in part on the medical care, properly so called. The results are especially due to the advice which is given to mothers as to the manner of nursing their offsprings, of bringing them up, and of nourishing them, and the habit which they acquire of paying attention to the least derangement in their health, and of seeking at once for a remedy, not waiting for the illness to increase. They acquire the practice of healthy habits, which become as much a second nature to them as were their bad habits and prejudices previously. At the dispensary of the hospital of Prince Pierre, of Oldenburg, where 20,220 children were treated in 1881, eight doctors are daily giving consultations ; and each child's name is written on a paper on which (like our own at Havre) the diagnostic particulars and treatment are put down. We saw mentioned (amongst other things) among the questions to be filled up by the doctor for each child, one on the cleanliness of the body and linen.

The mother, knowing that special mention is made on this point, fears a bad note, and this measure has its effect. As in Havre, the mothers learn also to bathe their children. But that is not all. Dr. Rauchfuss has had printed in the Russian tongue a little treatise entitled 'Counsels to Mothers,' and 31,000 copies have been distributed. Again here Dr. Rauchfuss meets us, for at Havre we have understood the importance of this manner of making our principles known amongst the people ; and we have also printed cards, or fly-leaves, which have found their way into the homes of the poor, and have little by little reformed their bad habits.

Again, I have to mention the founding of a dispensary used for policlinic at Rio de Janeiro.

On the 8th of March last Dr. Moncorvo writes as follows :—
'The Report published by Foville on your dispensary I have used as a basis, in order to demonstrate the important

service which might be rendered by such an institution amongst us. Our establishment has been open hardly a year, and I have treated more than a thousand cases of children. Dr. Moncorvo devotes a part of his interesting letter to prove (if proof were needed), that dispensaries for children might serve for practice with the same results as the hospital. I say that the dispensaries are even more useful to young doctors, because by their means they are put into contact with the real difficulties of patients. A doctor, worthy of the name, will be anxious not only to cure a serious malady, but also to reform bad habits, *destroy prejudices, and elevate the moral level of the poor.*

Lastly, a new dispensary has been founded at Havre ; and I will leave it to my friend the mayor of Havre, Mr. Jules Siegfried, to speak of it. I have finished, ladies and gentlemen, this rapid, but perhaps too lengthy sketch. I hope sincerely not only to interest you, but, above all, to place before you an example to be followed, if you are convinced that this new method of public relief is adapted to English customs. My only object in becoming an exhibitor in this interesting exhibition is to be useful, and my best recompense will be to know that I have succeeded.

DISCUSSION.

Dr. GIBERT then described in detail the arrangement of the building with the various rooms, baths, electrical appliances, and gymnasium, attached to it, the whole forming a complete apparatus of therapeutic appliances, open to every poor person, such as was rarely accessible to the rich, even at great expense. His remarks were translated into English by Mr. Mocatta.

I will now explain the arrangements :

First, there is the waiting-room, which serves also for a dining-room, and conducts to the surgical dressing-room, close to the doctor's consulting-room.

The waiting-room is simple, and contains only benches for women and children.

The surgical dressing-room contains all that the directrice may desire for dressing, linen, listerian cotton, phénique or boraté, collyriums, necessities for washing the nostrils, instruments for pulverisation of all kinds, cold and hot water, &c. The light is brilliant, and enters from a skylight.

The doctor's consulting-room contains all that is necessary for the examination of patients—examination table, which serves also for operations; and, in a dark room adjacent, the artificial light necessary for the examination of closed cavities, particularly the examination of the nostrils, of the pharynx, the ear, and eyes.

A small alcove is for the undressing of elder children, so that decency may be observed.

Everyday consultations are held at eleven o'clock. In a special register every child's name, address, and age are inscribed, and whether fed by the feeding-bottle or the breast, its diagnosis, and the treatment prescribed. It is unnecessary to say that each child is thoroughly examined, and that the doctor obliges the mother to undress it before him; thus all errors against health and cleanliness come to view and are pointed out. So that the result of this kind of examination is a sort of perpetual sermon, which combats the prejudices, reforms the habits, and produces all the more good by being repeated without fail every day.

The child having been examined, the treatment is decided, and, as far as possible, carried out at appointed hours by the personnel of the establishment. But before arriving at the therapeutic results to which I wish to fix your attention, let us finish our stroll through the establishment.

Here are the bath-rooms, open from morning to night, with tepid, warm, and medicated baths, also a large trough, instead of a bath, in which four, six, or eight children can be bathed simultaneously, thus saving both time and money.

Here is the heating apparatus, which is the actual automatic servant of the Dispensary, for it does nearly everything. First, it warms the whole Dispensary by the steam taken into each room by copper pipes. Secondly, when the steam has warmed the establishment it returns and condenses in a reservoir which feeds the children's baths. Thirdly, it serves to give vapour baths and vapour douches in the hydrotherapeutic room. Fourth, it furnishes also the alimentary kitchen in which the cooking is done by means of a double-bottomed boiler, in which the steam circulates. So the cooking is equal, and the meat and rice form an excellent soup.

In the next chamber is a sudation-box and a hot-air bath, which is very useful in all cases of muscular rheumatism or spasmodic muscular contraction.

At last we reach what I call the miracle chamber ; it is the shower-bath-room—the hydrotherapeutic room. Here are found two principles or methods of administering douches to the sick—the shower-bath and needle-bath. The first condition to fulfil, so that a cold douche may do no harm, is that the room should be constantly kept at a high and uniform temperature ; that of twenty degrees centigrade is the lowest that our observations would lead us to allow. This temperature is obtained by means of hot water-pipes that run round the walls of the room and on the lattice of the flooring by means of winding pipes.

To increase the heat in the winter, a reservoir of steam is placed along one of the walls, and it needs only to turn a tap to raise the temperature.

Thanks to these absolutely necessary precautions, one can give douches all the winter without ever having a single accident. In effect, it is important in the application of cold water, before all, to regulate the reaction, so that it may never fail. In this way, after much experience, I can affirm that one may submit the youngest child to the different hydrotherapeutic processes without ever producing bronchitis or congestion in the region of the viscera.

In the same room, and as an accessory to the cold

douche, will be found a steam-tube ; it is used to rouse up the suffering limbs, in which it is wished to provoke an energetic, calorific action before the douche. This powerful means is especially useful, as I shall say further on, in the numerous cases of chronic arthritis, when the acute stage has passed off, and the only important thing to guard against is the re-absorption of inflammatory matter, which is an obstacle to the movements of the joints.

All round the hydrotherapeutic room are placed heated dressing rooms, where the children are certain of finding the means of reaction under the influence of the warmth of the room, and of energetic friction.

Adjacent to the hydrotherapeutic room may be found the shampooing room (*chambre de massage*). We use there therapeutic means that the ancients, the Greeks and Romans, had brought to a high degree of perfection, and which had been entirely lost to view in modern times.

It is to Swiss surgeons that we owe the revival of shampooing. At the beginning of this century, two surgeons, Venel and d'Ivernois, founded at Orbes, then at Paris, orthopedic establishments, where shampooing played a most important part. Their disciple, Dr. Mellet, to whom we are indebted for an excellent little treatise on orthopedics, made the use of shampooing in Paris quite common. To-day, our numerous and important essays have regulated and defined shampooing, which in country places had remained in the hands of quacks and charlatans. In the Havre dispensary *massage* is one of the most efficacious means used in every case, and they are numerous, of chronic diseases of the joints, in those, not less numerous, of paralysis, and indeed of atrophy of all kinds.

The professor of gymnastics is at the same time in charge of the shampooing room. Lastly, and to finish the description of the establishment, let me point out to you the gymnasium, on which I wish particularly to concentrate your attention. It seems in effect strange, that in a country like England, where exercise of the body is more thought of than in any other country in Europe, medical gymnastic

establishments are not in daily use. I do not know whether during the last few years any have been established in London, but I searched for them in vain at the time I made a stay of several months in this capital.

To demonstrate here the value of a medical gymnasium would be quite superfluous; no serious objection can be made to it. I prefer only to say that the medical gymnasium, with its special apparatus, in no wise resembling the apparatus of the circus-acrobats, is the indispensable requisite of a dispensary for sick children.

It is not only to the numerous cases of chronic diseases of the frame that it is applicable, but to a host of medical complaints, such as choreus in all its forms, weakness of constitution and incomplete convalescence from acute illnesses, &c.

There remains to me only to speak of electricity, to have run through the list of therapeutic means, or agencies, which the dispensary, such as I have conceived it, puts at the disposition of the doctor.

Electricity has until now been left in some manner to the use of the rich, and even they are soon tired of it; they must wait too long to obtain a tangible result. In our dispensary, electricity is used under two forms, the currents of induction (or faradisation), and the continued currents which we use to restore the invalids who, without it, would be condemned to a life of incurable infirmity. I speak here of that multitude of children who, after having been attacked by convulsions, myelitis of rapid progress, have one or several of their limbs subject to the ravages of progressive atrophy.

One must have great perseverance to obtain success, and it is not rare to have to wait six months before seeing the least sign of progress. But as soon as the least progress is perceived, one may be sure that it will continue, will be more marked, and at last, the limbs condemned by the disease to certain death, take new life, and permit the little patients to learn a trade which will save them from misery.

To all these therapeutic means, which give the doctor a

set of implements so complete that he is able to attend to the poor child with the same care as to the rich child, we must add the resources of an alimentary kitchen. This in our dispensary at Havre is only in use during the six winter months. All children who seem to have more need of restorative nourishment than of medical care, receive a ticket which enables them to take every day a good meal composed of meat and rice with gravy. This meat soup, cooked as I have already said, by means of a uniform heat produced by steam, is an excellent food, when the repairing elements meat, fecula, and fat, are mixed in sufficient proportions.

The doctor of the dispensary requires intelligent attendants to second him. At Havre the dispensary possesses the following staff: 1st. A *directrice*, whose duty it is to be present at the visit of the doctor, to remember and carry out all the prescriptions, whatever they may be, do the bandaging, give the baths, distribute medicines, and give the douches to all the girls and boys of tender age. 2nd. A professor of gymnastics, who practises the *massage*, of which I have spoken before, and who gives the douches to the boys; 3rd. A stoker, who takes charge of the heating apparatus, who cooks and serves the meals, and cleans thoroughly the establishment every evening, using plenty of water to wash it.

The CHAIRMAN having invited questions, or remarks, Dr. Gibert stated, in answer to questions, that the medical officer did not reside on the premises, but was always accessible, living within a short distance, also that no infectious diseases were treated at this dispensary.

Mr. HODGSON PRATT stated that in consequence of the success of this dispensary the Municipality of Havre had now established one of their own.

Dr. W. DEANE BUTCHER, M.R.C.S. (Windsor), said he had had an opportunity of inspecting this dispensary for several days, and he could only say that it was most admirably carried out in such a way as he had never seen in England, and he should be glad to see it imitated.

Dispensaries in England, both for children and adults, were certainly very numerous, but the great peculiarity of this one was, that at all hours of the day there was help at hand ; in case of an accident there was some one to give the first aid to the wounded, and if a child were taken with a cough in the night there was some one to give advice, and thus the proverbial stitch in time, which was of so much importance in the case of children, could be secured. Dispensaries in England were mainly used for distributing medicine to the poor. In this case medicine was a secondary consideration, the main reliance being placed upon the baths and other hygienic appliances. As he understood, the children of the rich were also allowed to attend on paying a small fee, so that it was partially self-supporting. In this country, as medical men knew too well, there was no place where one could get a child's eye washed, or its ears syringed, or douche baths administered, or electricity applied ; but here, for a small fee, could be obtained everything which could not be got in England, without the expenditure of an enormous amount of money. There was no place that he knew of in England in the country where a wound could be dressed with ordinary antiseptic precautions as it could here, and although he had seen many foreign institutions, he had seen none to compare with this one, or which could be imitated with better advantage. These results also were obtained at an absurdly small cost. In this country, a doctor sat down in a little back room, and gave what he could to children who required treatment, once or twice a week, but that was not all that was done here. There was someone there day and night, and medical help of the best quality could be had at a moment's notice. It was a thing which did not require very much to start it, and could easily be done. Any charitable lady who would hire a cottage, and a nurse, and provide for doctors attending one hour every day, might begin the nucleus of such an institution, which could be easily developed by degrees. Most of the things which were done here, were

also done in England, but at various institutions; they were not all combined in one, and some of the appliances, particularly those used in cases of paralysis, and epilepsy, were not to be found at all in England. It would, therefore, be conferring a great benefit not only on the poor, but on the nation, if such an institution should be established. Allowing the rich to attend on paying a small fee was a very good feature, because, if that were done, it would follow that everything would necessarily be kept clean, and nice, and there would be no roughness in dealing with the poor. He was informed by the Prefect of Havre that in their institution, that the fees received from the rich paid the expenses of the poor.

The CHAIRMAN asked what would be the outlay for such an institution?

Dr. GIBERT said the whole cost of this one, including the ground, was about £2000.

A GENTLEMAN said there were numerous cottage hospitals in England where patients were sent and attended by their own doctors, but they did not resemble this. It would be absurd to suppose that the children of the poor in London could be properly treated at home, because in many cases there was only one bedstead for father and mother and several children.

The CHAIRMAN said he looked upon this dispensary as a remarkable instance of sympathy by the wealthy towards the poor, which we wanted more and more of in England. He was convinced we were living too much away from the poor, and did not see enough, or know enough of their condition. If the wealthy woke up to the responsibility which attached to the possession of property, something in this way would soon follow, and it appeared to him to be absolute common sense that the poor should have facilities for sending their children to such an establishment. He did not wish to depreciate what was being done, but he did not think we did half enough. He was only sorry that the details of this scheme could not be circulated more generally, for he was persuaded it would be of very great value.

Rev. LOUIS STOKES said, as regards the East End, the parents had abundance of medical skill at their disposal, but what was wanted was to have grouped together the various therapeutic aids which were of such great service.

Mr. MOCATTA said he was desired to say that Dr. Gibert had founded at Mulhausen, at the expense of Mr. Engel-Dollfus, who had laid out £16,000 upon it, a dispensary similar to this one, showing what could be done by the generosity of an individual who had already done in other ways immense service to the working population. He wished they could find such benefactors in London, or in our large manufacturing districts, who would do the same.

The CHAIRMAN said he would rather find the means of establishing in moderate towns, or large villages, buildings of this kind, which would cost not 16,000*l.*, but 1600*l.*

M. ALBERT TACHARD said, as a former Member of Parliament for Mulhaus, and a witness of what had been done in Havre, he had much pleasure in inviting any who were passing eastward to call at Mulhaus, and inspect the establishment there, which he was sure they would find interesting.

Mr. ALLEN LAMBERT thought, if the attention of the numerous medical provident societies could be called to this matter, it might result in the establishment of several such institutions on a small scale. The danger of establishing anything of this kind on a purely eleemosynary basis, would be, that it would tend to lessen the spirit of independence, which ought to be encouraged to the utmost.

The CHAIRMAN said there was a very large movement now at work in the direction of self-supporting dispensaries, and it would be a pity to do anything which would check that tendency to independence, but perfectly consistent with that there might be voluntary aid given by those who had the means, and he should be glad to take part in the establishment of one or two such places, under conditions which would lead to the extension of the system.

Mr. LAMBERT thought the capital necessary to establish the thing might be found by persons who had means, but

it should then be kept up, as the Medical Benefit Societies were kept up, by the contributions of members.

Mr. BUNN, SECRETARY of the METROPOLITAN PROVIDENT MEDICAL ASSOCIATION said he had been labouring for the last three or four years to establish such institutions as the Chairman had just referred to. The principle originally was not only to make them self-supporting, but that their outfit and the money needed for their establishment, should be repaid, and that was still the principle adhered to. They had now one or two branches entirely supported by the members' contributions. It seemed to him they only wanted a little of this development to make them perfect; and if they could add some system of this kind by which people in poor circumstances by paying a certain contribution could enjoy the advantages of such an institution, it would be an inestimable benefit. He saw no reason why the whole mass of the working classes should not, with a little assistance in the way mentioned, be able to provide such places. A person who could not pay a large sum down must be able and willing to pay a regular rate of contribution, and the members of some of these dispensaries were now numbered by thousands. The income of the one at New Cross was between 500*l.* and 600*l.* per annum; and there was another at Croydon, nearly as large, entirely maintained from the small contributions of the working classes on the friendly society principle. As a trustee of the Hearts of Oak Benefit Society he felt sure that, if this matter were properly ventilated, several of those large societies would associate; and if the initial expenses could once be met, he had no fear but that the subscriptions would be sufficient to support it. In reply to a question he said the contributions were 1*s.* per month for man and wife, a smaller amount for children, and he added that they would have to go very low, indeed, in the social scale to find persons who could not pay 3*d.* per week all the year round for medical attendance. Below that level he thought parties must depend on the Poor Law in some way.

The CHAIRMAN then proposed a hearty vote of thanks

to Dr. Gibert for the information he had given. Nothing was more calculated to arouse interest than the condition of the sick children of the poor, and anything that mitigated that condition of things must be welcome. He hoped it would be known that this model was in the Exhibition, and he only wished Dr. Gibert could be present to explain it. He could only repeat that he, for one, was ready to join in establishing one or two of these dispensaries in suitable neighbourhoods.

A vote of thanks was also passed to the Chairman on the motion of Mr. Hodgson Pratt.

ETHICS OF THE SKIN.

BY

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A LECTURE ON ETHICS OF THE SKIN.

By MALCOLM MORRIS, F.R.C.S., ED.

Surgeon to the Skin Department, St. Mary's Hospital.

Sir JOSEPH FAYRER, K.C.S.I., F.R.S., in the chair.

THERE is in the Gallery at Bruges, a picture of a man being flayed alive. The picture is by no means so horrible to the eye, as its bare title doubtless is to the ear. It is an ancient work, and there is about the countenance of the man a look of ostentatious indifference, a bland woodenness of mien, that is usually associated in the mind with ecclesiastical art. The picture, however, such as it is, when viewed from an æsthetic stand-point, offers an excellent demonstration of the value of the skin. The value of a thing is its degree of indispensability. Estimate this, if you can, and you have a fair measure of its real worth. The world, possibly, had formed no adequate conception of the value of clothing, until Carlyle—in the best conceived of his works—depicted the social, moral, and intellectual conditions of a world without clothing. It is needless to attempt to exalt the importance of the skin, by dilating, in like manner, upon *its* indispensability. The subject can probably dispense with such treatment. Still, it is curious to note how much of a man's individuality lies simply in the skin itself. Deprive him of other anatomical factors of his body, and he may still remain a recognisable being. Remove an arm or a leg, or even both arms, and both legs,

and there is yet left an individual man. Efface the nose—depose an eye—and still the residue has some individuality about it. But take away the skin, (as the author of Sartor Resartus took away the raiment), and individuality is gone. To the bulk of the world there would be no longer left a human being at all, but merely a *specimen*, a *preparation*, a something anatomical. Had Sydney Smith paused to realise in this way the possible effects of a consummation of his wish on that hot summer day, the world would probably never have heard of his weird desire to take off his skin and to sit in his bones.

However, without pressing the point any further, it may be taken as conceded, that the human integument *is* of importance, and, perhaps, even of *sufficient* importance to justify this lecture.

Let me try in a few words to give some idea of the structure of this rather complex organ. The outer or scarf skin, that which is shed during fevers, is dense and hard, composed of scales, or flat plates, lying in layers of varying thickness. This skin is thinnest on the eyelids—thickest on the foot. Beneath the scarf skin is a soft mucous layer consisting of some half-dozen rows of small bodies called cells, laid regularly like bricks in a wall, and held in position by a kind of cement which fills up the spaces and holds the cells together. As the scarf skin wears away, it is renewed from this layer; the two together forming what is termed the epidermis, (*epi* upon *derma*, the true skin). It is in the mucous-layer, and beneath the scarf skin, that a blister gathers the moisture, and not below in the true skin or derma. That is composed of much more complicated material than mere scales and cells. Stripped of the epidermis, the surface of the derma would, under a microscope, present the appearance of a miniature ploughed field, furrow and ridge in alternation, and if we looked on the under side of the scarf-skin we had removed, we should find elevations and depressions in it, that would exactly fit into those on the derma. These promontories are termed papillæ, or little hills. They are the cause of the wave-like

lines on the hands and face. Between the rows of papillæ, lie the openings of the sweat glands, the tubes of which take a spiral form as they pass to the surface. It is the derma or true skin of animals, that when stripped of hair is tanned for various uses, the papillæ giving it the uneven surface always observable in leather. The derma itself is composed of a marvellous framework for the reception of all kinds of living apparatus. In it ramify the vitalising tubes called blood-vessels, others called lymphatics, the wondrous telegraphic system of nerves, the oil, and sweat glands, sacs in which the hair grows, and little bags or receptacles for fat. The framework of the derma consists of fine fibres, compact at the surface, but less dense deeper down. The derma of animals when boiled is known as gelatine. The familiar dish, boiled calves' head, may be cited as an illustration.

We have said that the fibres of the deeper parts of the derma or true skin are less dense, *i.e.*, its meshes are coarser. In these spaces lie the glands, and certain small cushions of fat, while in the papillæ we have spoken of, we find the loop-like termination of a blood-vessel, and in some of them the peculiar ending of a nerve.

In the skin, as in other parts of the body, there are two sets of tubes. The blood circulates in one set, and a fluid called lymph in the other set. Time will not serve for me to trace the crimson blood from the heart to the arteries, narrowing as they approach the surface into millions of capillaries, threading their way in all directions, and carrying food to the oil glands and glands of perspiration, to the roots of the hairs: nor can I stop to show you the marvellous system of veins by which the blood is collected from the capillaries; and how it is conveyed through tubes gradually increasing in size, back to the heart, blue and impoverished by prodigal expenditure of its oxygen upon the parts through which it has journeyed. A perfect network of these vessels permeates in all directions the derma or true skin. I must even limit myself to a bare mention of those other vessels the lymphatics, which collect

and carry off some of the fluid matter of the blood, acting as drains for the surplus moisture. Mere mention, too, can be made of the nerves, which, following the courses of the different vessels, act on their muscular coats, and produce contraction or dilatation, and those that convey to the brain a sense of touch when contact occurs at the free ends. Had we more time we could follow out this grand system of telegraphic communication in its ramifications through the skin, and watch its action upon the sweat glands—opening or closing them in obedience to instructions from the brain, which may most properly be termed the *head office*.

All these agents are incessantly engaged in nourishing, cleansing, and secreting, and by their labours the skin is enabled to perform a sevenfold function.

1. It is a protection to the external surface of the body and supports the internal organs. 2. By means of the nerves it imparts to us sensations of touch, pressure, temperature, and pain. 3. It secretes oil. 4. It is an organ of respiration supplementary to the lungs. 5. It has powers of absorption. 6. It acts as a purifier. And 7, and lastly, By the aid of perspiration the heat of the body is regulated, and retained at almost an equable temperature. That is to say, in health, when there is free circulation of blood through the skin, as the heat of the body increases, it is lowered by the evaporation of the moisture exuded proportionately on its surface, just as hot pipes can be cooled by the application of wet rags. This brief glance is as much as I dare ask you to make now, at the structure of the skin, and the few and rapid hints I have been tempted to make on the wide and interesting subject of its functions must perforce suffice.

There are of course varieties in skin, and the first matter that presents itself in considering such varieties is the matter of *complexion*. This subject seriously exercises all those who are artistically minded. It has served almost for the foundation of codes in taste. It has fired the imagination of a cloud of poets, from Horace downwards.

And lastly, it has greatly moved the modern æsthete, who has strange things to say about the tinting of the human skin, and uses strange words in which to say them. Yet after all, complexion strictly speaking, is, in all its manifold gradations, merely a matter of pigment molecules. This statement may not sound picturesque but it is true. I have just described the mucous layers of cells lying upon the papillæ of the skin. In the deepest strata of these cells are collected certain little black pigment molecules, and these showing through the semi-transparent integument give the colour to the part. Let a poet gasp out rhapsodies in praise of some dark-complexioned beauty,—he is merely chanting a pean of praise to an *arrangement in pigment granules*. An indefinable tinge of the tenderest brown upon the skin is merely due to a fortuitous disposition of pigment cells. Let the eyes of Chloe be called luminous, let them be compared to jet or coal, or any other mineral, their beauty will yet depend solely upon the amount of pigmentary dust in the iris. If one is disposed to admire the delicate and picturesque tinting of the surface of some dark-complexioned individual, let him not imagine it is due to any mysterious elements. Here, on this little piece of glass is a section of the skin of a dark-complexioned woman. Here is the very material used in the production of that complexion, and the very pigment that Nature employs to produce the actual tints that so many admire. Unfortunately or fortunately one cannot alter one's complexion in a material manner. The matter is one of congenital peculiarity, and the object of my remarks has merely been to eliminate from the subject the element of mystery. A fair complexion on the other hand owes its characteristics to negative properties—to the presence under the integument of a scanty supply of pigment molecules. By the gradual abstraction of these minute particles the skin becomes purer and fairer, until at last one arrives at a perfectly pigmentless individual, an *albino*, one whose skin is white, whose hair is colourless, and in whom the iris is so transparent from the absence

of pigment, that there is seen the pink reflection of the layer of blood vessels at the back of the globe of the eye.

In determining the tinting of the skin there is another element involved that may—to employ a somewhat spurious distinction—be said to be a matter of *colour* as opposed to complexion. To consider the subject in the concrete we will take the skin of the face as an example for illustration. I need scarcely point out that some cheeks are pallid, while others are rosy, and perhaps a few are rubicund. It will be obvious moreover that this question of colour is quite apart from that of complexion. From the pale cheek of the typical nun to the ruddy face of the dairy-maid, and further, to the empurpled nose of the Bacchanal cab-driver there are many gradations. Other things being equal, these gradations of tint depend simply upon *Blood*. That fine pink colouring seen upon a fair skin, about which the æsthetically-minded have raved, and which has been compared to everything beautiful under the sun, is simply an *Arrangement in Blood*. The basis of the matter then is this. Beneath the skin, there is a marvellous network of minute tubes, the blood vessels already referred to. Through these tubes the blood is circulating. The majority of these little pipes are so small that one of them would bear about the same relation in size to a single hair, that a silken thread would bear to a cart rope. They are so transparent that the colour of the circulating blood within them can be seen through their walls, and this again through the semi-transparent skin. If these little channels contain but a scanty amount of blood the skin is pale. If they are engorged the surface is purple. If they are moderately filled the integument is pink.

It is almost unnecessary for me to point out that this colouring of the skin depends upon the general and local circulation of the blood, and that it is largely a question of health. This is merely a matter of common experience illustrated by a comparison of the pallid cheek of the sickly with the ruddy hues of those who are robust.

The colour of skin as a test of health is a very valuable one, although by no means infallible. There are errors of

excess, as well as errors of deficiency. Were this test a strictly accurate one, the most healthy members of the community would probably be certain convivial beings, who owe their rubicund complexions to a circulation disturbed by the influences of "the flowing bowl." Moreover, many people in quite indifferent health may have ruddy cheeks or as the expression goes "may have plenty of colour on their faces." In such, this feature will depend upon local changes in the circulation, into which I need not here enter.

There is still one point in connection with this matter which might be mentioned before I leave it. It refers to abrupt fluctuations of colour in the skin, to sudden pallor and to the equally sudden blush. The little blood vessels to which I have alluded, possess a very strange faculty. They have the power of regulating their own dimensions. They can so narrow their channels that absolutely no blood can enter. On the other hand, they can in a moment so enlarge their walls, that a comparative torrent can flow along them. When these little vessels become contracted, therefore, the surface becomes pallid, while their sudden dilatation means a sudden blush. This curious property is derived from the nervous system, and there is actually a considerable part of the nervous system that has for its sole function the regulation of the blood vessels. Every vessel in the body is under this nerve supervision. Every little tube has its regulating apparatus. There is indeed scarcely any part of the organism that is more sensitive in its action, or more elaborate in its arrangement. If a shock of a certain kind be received by the body, that shock is transmitted to this blood regulator, the vessels contract, and the face becomes pallid. If a shock of another kind be experienced, the regulator passes on an order, as it were, for the blood vessels to dilate, and as a result, a blush diffuses itself over the skin. In fact, a blush merely means a sudden dilatation of the surface blood vessels. This is all, in spite of morality and romance. One can speak actually of the chemistry and physics of the blush upon a maiden's

cheek, and reduce it to figures, and express it upon paper, and deal with it as one would deal with any common thing, such as a contract for coals. At the risk of wounding the feelings of those who are poetically-disposed, I am compelled to state, that blushing is on the same physiological basis as perspiring. So unless perspiring is poetical here the romance must end. The susceptibility of individuals to blush or to become suddenly pale, depends upon many things. Upon the sensibility of the nervous system, upon youth, upon health, upon education and disposition, and one's immediate surroundings. A volume might be written upon the moral and intellectual significance of blushing. It is one of the few expressions that are spontaneous, that are beyond control, and that can never, except in the rarest cases, be reduced to a fine art. It is to some extent a test of the sensibility of the nervous system, especially of a sensibility that is over-strained. A young girl just leaving her teens may blush scarlet at the bare mention of her name, or at the sudden appearance of a stranger, while she may become pallid at the apparition of a beetle, and absolutely ghastly at the spectacle of a mouse. On the other hand, a well-battered man of the world may feel a properly-timed blush about the only expression that he could not master after the most desperate efforts.

Having disposed of these matters, that may be considered as preliminary, we may now discuss the relation of Skin to *Art*.

« Skin and Art!! some may exclaim. What, pray, have your papillæ, and epidermis, your glands, and follicles to do with Art? What concern has the painter with capillary plexuses, with pigment granules, or with epithelial scales? In answer, I would merely point out, that any picture gallery of average size will present upon its walls many square yards of human skin; that its perfect rendering by artistic methods is no insignificant element in the painter's art, and that such work can best be criticised from a standpoint that is strictly anatomical.

Within the last few years we have experienced in this

country a great and remarkable artistic movement. By means of agencies that I need not specify, art has been strangely popularised. There has been a striking development of that mental quality somewhat vaguely known as *taste*. The phases of the movement have been manifold, and its influences have flowed into many channels. The effects have been evident, not only on the walls of picture galleries, but they have displayed themselves in the humblest details of domestic life. We have artistic furniture, and artistic wall decorations, artistic hangings, and artistic water-jugs. It has become possible to attire oneself in artistic raiment, to express one's ideas on artistic note paper, and to arrange one's limbs after an artistic manner. A curious form of language, moreover, has arisen in connection with the movement; a language that even yet—to use the expression of the Prayer Book—cannot be said to be “understood of the people.” The elasticity of the English tongue has been sorely strained of late to find epithets for the beautiful; to find material for rhapsody; and a vehicle for criticism. There are those who consider that they are intelligible when they speak of an inanimate object as “too utter,” while there are others who conceive that a certain arrangement of colour and form is worthy of “being lived up to.”

In giving material expression to the movement, a sudden passion has been developed for forms of art that were supposed to be obsolete—for Oriental pigments, and for Japanese eccentricities. There has arisen, moreover, in certain quarters, a species of vegetable idolatry, and an extravagant exaltation of certain botanical forms. Lastly, and it is with this point that I am most concerned, there has sprung up a taste that can only be postulated as a taste for disease—a leaning towards the outward expressions of decrepitude and decay. In the literature with which this movement has been materially supported, we hear much of death and dissolution: we find a new Deity in “our lady of pain:” new objects for admiration in individuals limp with woe and pulseless with grief. It is

sought to arouse our sympathies by the picture of men rendered ghastly by violent and unwholesome emotions. It is attempted to extract sentiment and beauty from the weariest phases of human wretchedness. In one school at least of this art-movement we find a bevy of woe-begone women, ill, limp, and unwholesome. They look thin, and weak, and weary. Their complexions are not those of health, and their attitudes are those of a long-enduring debility. The men, too, are not more attractive in a sanitary sense. They look like an army of convalescents; they appear ill-fed and out of condition; and have constantly the aspect of those who are in pain.

I am aware that these are extreme examples, and that they pertain to a school of art that is not very wide in its range. But the influence of that school is felt beyond the limits of its own lines, and has some effect in quarters where its power would be, perhaps, strenuously disowned. Taking alone the subject of the representation of the skin, it must be acknowledged that there is a certain leaning in modern art towards tastes that are diseased rather than healthy. If a properly qualified medical man could step down from the moon, and could visit first a gallery of the older masters, and then take a glance at some of the human phenomena on the walls of the present Academy exhibition, I venture to think that he would be struck with the decided difference in the artistic skin. In the older works he would find ruddy Madonnas, and clear-skinned goddesses, and chubby angels. In the more recent—putting aside mere portraiture—he would find that a kind of etherialised skin was unduly popular. A skin too transparent, and too pale for health: a bloodless kind of covering, that is associated with debility and disease rather than with perfect health and vigour.

The origin of this leaning towards what is morbid, this disposition to recognise beauty in disease, is not far to seek. In searching for an expression of the higher phases of female beauty and attractiveness, there must needs be an elaboration of those points that constitute feminineness,

This term—if it be a term—can be best understood by defining it as the opposite of the term manliness. If it be the distinctive features of the typical man to be strong, aggressive, and self-asserting, it would appear to be the proper quality of women to be dependent, gentle, delicate, retiring. It is not difficult to see that an exaggeration of these qualities may lead to morbid manifestations, and that straining after superlative effect, the line may be passed that separates the real from the unnatural. That line has been passed by the so-called æsthete. In the æsthetic woman, delicacy has passed into sickness and emaciation, tenderness and gentleness have lapsed into a kind of flabby imbecility, her natural weakness has become unwholesome, and is expressed by an insipid limpness. The female æsthete excites sympathy, not because she is a woman, but because she is in feeble health.

It is much to be regretted that this interpretation of feminine qualities has passed into actual life. There are some who regard as the most attractive female, the languid being who seeks the shade of dimly-lighted and æsthetic chambers, who cultivates a pallid cheek, an angular jaw, and towzled hair, who clothes herself in faint coloured raiment, and who wishes to be regarded as too frail, and too highly-organized for ordinary contact with the world.

Of course this repudiation of warm tints in the complexion suited unhealthy people well enough. One cannot blame *them*. And having outraged Nature's laws of health, it was a master-stroke to contrive that the penalty of pallid cheek and sunken eye should become the badge and type of beauty. It was more clever still to be able so to advertise this fashion of pale faces and to familiarise the world with it, that eminent painters were presently found willing to depict this pasty complexion in illustration of beauty. But what shall be said of Art that lends itself to such deception? By all means let us have representations of disease, but let us call such pictures by their proper names and exhibit them in their proper places; not in our

Art galleries as types of loveliness, but hung around our ball-rooms, if you will, as restraints upon over-indulgence, even as through the ancient banquetting-halls was carried the corpse—*memento mori*—to remind the feasters of death. But I have no wish to be unreasonable. Ideals there must be, and a woman would be more or less than a woman did she not endeavour to conform to recognised types of beauty. Whether she acts wisely in blindly imitating the fashion of the day in everything, regardless of its unsuitability to her own peculiarities, I am not here to say. Such eccentricities are seldom injurious. Human effort at imitation has never ended so fatally as did the frog's effort to assume the proportions of the ox. It was something humorous to notice when Society set its seal upon small bonnets, with what obedience heads began to reduce themselves accordingly. All this is harmless enough. So, too, though very ugly and nothing more than a copy of the wasting in consumption, is the now common practice of darkening the eye-socket to increase the apparent size of the eye. But when in addition to all these devices, a decree goes forth that powder is to be applied to the cheeks from morning to night, to the utter destruction of the complexion, it is time to speak out. And that it does so destroy it is attested at this moment by thousands of skins puckered and pitted, that, but for using powder, would have remained to this day soft as silk. The constant use of powder has precisely the same effect on the glands of perspiration, as the overstraining of the voice has upon the throat of a clergyman or public speaker. With the continuous exertion to secrete moisture to lubricate the throat, the glands become exhausted, and give out so small a supply, that if speaking be persevered in, an obstinate complaint termed clergyman's sore throat is the result. So, with the glands of perspiration in the face. As the powder dries up the moisture, more and more is secreted, till the glands become at last unable to fulfil the unavailing task, and shrinking, produce the little chasms that give the orange rind appearance that is but

too familiar to all observant people. As on the petal of the flower, and on the wing of the butterfly, so on the healthy human skin, there is always a delicate down that no powder can simulate, and any excess of this is disease. Were I now addressing you in the lecture theatre of a Hospital (which I dare say my lady-hearers will be pleased that I am not), and I could take you with me round its wards, I could better illustrate what I have to say about powder. There you might see a child, who had been weeks in bed with some severe illness, its face dry and covered with a down, far finer than any toilet preparation, and compared with which the finest granules of starch are as paving-stones to pebbles. So that you see even our very best efforts at copying this phase of disease must of necessity be coarse, and the effect as a matter of fact, is actually more ghastly than the original. The immediate action of powder when applied to the skin is to fill up all uneven surfaces, to conceal greasiness and to hide blemishes of all kinds: the result—a rough, bloodless, deathly pallor. Nor would rouge, however carefully applied, make matters much better. The warm tints produced by myriads of bright red points of blood in the papillæ, and faintly visible through the translucent epidermis, are inimitable, and defy simulation. Note the difference between the stippling in a steel engraving and ink laid on with a brush.

The ruddy, clear, firm skin of vigorous health is condemned as vulgar. The cheek must be white and bloodless. The rosy hues of the dairy-maid must be avoided, since those hues are too crude and suit not æsthetic surroundings, the face must be shielded from the breeze, and from the sunlight. To show upon the cheek the effects of the open-air, and the summer sun, is to outrage artistic sensibilities. As for the "nut-brown maid," the modern damozel points at her with the finger of scorn, the refined lady with artistic tastes passes her by on the other side, the æsthete gazes on her, and says within himself, "tush." There is no need to point a moral in this matter. The position requires no careful defining, which accuses the

freshening breeze of being low, and credits the sunlight with vulgarity.

To silence criticism, and for self-protection, this section of Society has formed itself into Schools of Art, and painters of talent have not shrunk from linking their names with *its* perverted teachings.

Do not let me be misunderstood. I am not contending that Art, or even false Art, is responsible for this deterioration in ideal beauty. That could not be. It is Society, in certain degenerate conditions, that has called upon the Poet and Painter to express for *it* its own peculiar thoughts ; to paint its deformities and to sing of the "beauty of decay." The *demand* has created the supply. I suppose at some period or other, as life got faster, it must have happened in this wise to some *débutante* into what is termed Society. The first few seasons' dissipations had stolen the roses from her cheeks ; for a time, perhaps, she simulated them, but very badly at the best. Besides, the colour was so steadfast, so unchanging. It would not "come and go," except in the sense in which Backbite refers to it in the School for Scandal, when he denies that a certain lady's colour will not "come and go," asserting that he has seen her maid both fetch and carry it. Besides, our lady found it perfectly impossible to be seen going home in the early morning with a patch of rouge upon each cheek like a columbine. So she determined to call to her aid the magic of her Physician, to conjure back for her the natural roses she had lost. This, of course, failed, too. Roses will not bloom in stifling air—they fade and die, be they real or metaphorical. There was nothing for it but to repudiate them altogether, "The grapes are sour," said the fox. "Pink cheeks are vulgar," said the *passé*, though still a young lady, whereupon all those who took their cue from her in dress and deportment, followed her also in the matter of complexion. And so the example spread, to the ruin of many a pretty face, whose chief charm was forthwith hidden beneath a veil of dust, and white-washed out of sight.

But time presses, and having done my best to condemn

that which I believe to be a great and growing evil, I gladly turn to a more congenial theme. In inviting your attention to the Structure of the Skin, just now, I purposely omitted any mention of hair, because it in no way affected the question of complexion we were then about to consider. Let me say a few words on that and kindred subjects now. Hair, which is a modification of the epidermis, is an appendage of the skin, having its roots in follicles or little jug-shaped bags. The hair-sac, as it is called, in which the hair-bulb is contained, is situated in the true skin, its base resting on a papilla by which it is fed, and where it grows, much as does a flower in a flower pot. The growth projected from the bulb is termed the shaft. The difference in colour observable in the outer and inner parts of this shaft, when viewed in transverse section, has probably led to the erroneous idea that the hair is a tube, which singeing after cutting would close, and so prevent loss of nutriment. The papilla which nourishes the hair bulb through its sac, embraces the sac most completely, and it is the rending of this close union which produces the jagged appearance at the end of a hair forcibly extracted, or as one may say, pulled up by the roots. You will see that the sacs lie obliquely in the scalp, and that in growing out of them through the epidermis, the hairs lie smoothly on the surface, whereas, if they grew perpendicularly they would stand erect. The hairs in every part of the body are arranged in various geometric curves or currents,—those on the crown radiating from its centre and passing in graceful sweeps over the whole scalp—the moustaches taking two outward waves from the median line, and so on. At the sides of the hair-sacs involuntary muscles are attached, whereby the hairs are drawn into an upright position. Sudden fright, or even a chill, will produce this condition, which has been likened to that of the “fretful porcupine.” A similar action of involuntary muscles in the skin itself causes the erection of the papillæ, the look of which has gained for it the term “goose skin.”

Cells, such as we have spoken of in the formation of the

skin, are put forth by the hair bulb, these pressed upwards by succeeding cells over-lap one another, and guided by the follicle, form a cylinder, up which a pith is projected, and presently the shaft of the hair emerges from its nursery, and dispensing with further support, commences its external growth and assumes the function of protection to the scalp.

The over-lapping cells on the external surface of the hair-shaft rendered dense by pressure from an epidermal layer corresponding to the scarf-skin. The appearance is that of a tiled or slated roof, and the over lapping is at once demonstrated if a hair be shuffled along between the finger and thumb—as it will always travel in the direction of least resistance—that is from root to point.

Some of the chief characteristics of the hair are its elasticity, susceptibility to the influences of the weather, stretching in damp, shrinking in dry air, for which reason hair is employed in some kind of barometers, or, more strictly speaking, hydrometers. As to its strength, a single hair will bear a strain of 4 ozs. : so that less than 600 hairs—a number that would be furnished it is estimated, by no more than one square inch of the human scalp—would support a man weighing 10 stone.

It is very elastic, and may be stretched from 1-5th to 1-3rd of its length. It is said to grow at the rate of about 4 to 6 inches in the year, and in summer faster than in winter, and of all that appertains to the body, it is the last to perish. The very bones go to dust before any change takes place in the hair. The chief requirement of the hair, as of the skin generally, is cleanliness, and one of the best agents for the purpose is good soap and water. Have as little to do as possible with advertised washes, which are usually superfluous, even when not absolutely dangerous. Abjure small-toothed combs, inordinately hard brushes, curling irons, and any arrangement of the hair that causes the slightest strain upon the scalp. Cleanse it at least once a fortnight with soap and warm water, adding a little yolk of egg if you wish, which is the

ordinary accessory in what is termed shampooing. Do not starve the scalp of its proper nourishment by wearing hats that press the region of the temples where the arteries enter it, and discard heavy head coverings of all kinds. The rationale of the cleansing action of soap is very simple. The dirt adhering to the various parts of the body is mostly composed of dust and other extraneous matter, combined with the perspiration and the greasy excretion from the skin. When ordinary hard soap is brought into contact with water it is decomposed, and gives up part of the soda of which (together with certain animal or vegetable fats, or oils) soap is composed. The soda, thus freed from the soap, unites itself with the unctuous dirt, which the water used in washing renders miscible, and so removes it from the skin or the hair. But it must be remembered that cleanliness like any other virtue unwisely pursued becomes a vice. I am not at all sure that the indiscriminate use of the morning cold bath is altogether free from reproach. Some skins require frequent washings, soakings indeed, while upon others the effects of constant ablution are most baneful, and there are others again who should rarely use water, especially hard water, and of course soap, which is still more irritating, as seldom as possible, consistent with bare cleanliness. There are many considerations connected with this subject, but I can touch only upon one or two, for my time, I see, is nearly up. Thirty years ago few indulged in the cold morning bath, now the man who does not, is, I was going to say, an exception. Doubtless, judiciously employed, and when a proper glow follows, it is a beneficial tonic. The blood driven from the surface by the contraction of the blood vessels is returned to the surface and the circulation is quickened. But where no reaction takes place, where the skin remains blue, the cold bath has done positive mischief, and next time tepid water should be tried. The truth is, warm and cold water have precisely the same results in different people. In the strong, cold water secures a reaction, and the same warmth is obtained

as is obtained directly, and without reaction, when a less sturdy person uses warm water. The effect is to quicken the circulation. In the one case the blood was driven in upon the internal organs, which in their turn propelled it again to the extremities ; and in the other case, the blood was drawn to the surface and extremities—the vessels in the skin being relaxed and opened by the genial warmth. And here I would just remark, that in some cases, where there is a tendency to lose the hair, the friction with the rough towel that is so beneficial in assisting circulation after a bath, and therefore so salutary to the skin, is by no means so advantageous to the hair, which it loosens and causes to fall in greater quantities. The use of oil that may favour the growth of one person's hair would prove prejudicial to another's. Some require to grease the hair, others have a natural superfluity of oily secretion.

We said just now that people differed in their endurance of water. Happily most of us tolerate it pretty well, and to such it is an inestimable blessing. Those having what is termed xerodermic skin, that is, skin which is hard and dry, can hardly bathe too often. Indeed, in extreme conditions of this kind, the most modern methods of treatment consist in complete and continuous immersion for weeks and months. In the Hospital at Vienna people live day and night in baths.

Others with delicate skins, are not only unable to bear frequent ablution of the skin, but even experience irritation and develop disease from the ordinary use of hard water. Such instances are, I admit, somewhat rare, but when they do occur, rain water will be found, as a rule, to meet the difficulty ; or better still, distilled water with a few drops of the spirits of ammonia or a teaspoonful of *sal volatile* in it. It is not generally known that distilled water (not pure, perhaps, but pure enough usually for our purpose) may be obtained by carrying the blow-pipe attached to all kitchen boilers to some cool place, instead of up the chimney, when the steam will condense and so produce

distilled water that can be stored for use. But whatever water be employed in washing the face, much of the comfort or discomfort of the operation will depend on the quality of the soap—an article for which, during 2,000 years, the inventive mind of man has failed to find an efficient substitute. Of the twelve or fourteen well-known kinds, that known as White Castile Soap is one of the purest, being made of olive oil, combined with linseed, poppy, or ground nut, rendering it less hard and more easily miscible in water. Well made curd is also a good soap, and there are many other excellent soaps made from other materials, such as castor oil, cocoa-nut oil, palm oil, variously scented and coloured. Avoid medicinal and fancy soaps.

It may be worth while to say here that, in using soap for the face, a plentiful lather should be made with warm water and rubbed in, not with the towel, flannel, or glove, but with the hands. The soap should then be washed off with tepid water and the face bathed with cold water. So much care is rarely needed in washing other parts of the body, but to those troubled with roughness of the hands I would say, do not attempt to remove such roughness with pumice-stone; it is a common and most pernicious practice, increasing the mischief it is employed to remedy. Fineness and coarseness of skin are very much the effects of circulation, improve this by the judicious use of bathing and friction, and a little glycerine and rose-water, in the proportion of 1 to 16, rubbed on the hands after washing will do the rest. No general instructions can be given to meet exceptional cases.

I am afraid that my observations have been composed mainly of denunciations and advice. I am not vain enough to suppose that either the former will be heeded, or the latter acted upon. Many of the practices I have ventured to condemn, have the good or bad fortune to be fashionable, and there is an axiom in society, as solemn as the Everlasting Aye, which proclaims that whatsoever is fashionable is right. Fashions, however, change. It may be that a time

will come, when it will be fashionable to be healthy, when normal hair will be popular, and a natural skin "the rage."

When this sanitary millennium is reached, it is possible that the world will recognise that it is not attractive to daub the face with starch and rouge, and bismuth and paint, after the manner of the heathen, that the bloom upon the peach cannot be beautified by whitewash, and that no chemical process can heighten the tinting of the heather bell.

At the conclusion of the lecture, the Chairman, in proposing a vote of thanks to Mr. Malcolm Morris, for his very eloquent and instructive lecture, said his scientific reputation as an anatomist and physiologist had insured its being an interesting address, and he would most strongly recommend all who had listened to it to follow his advice and attend to his denunciations. He did not refer so much to the latter part of the lecture, which dealt more with matters concerning health, though they were perhaps more germane to the occasion, but he had been particularly struck by his remark with reference to the debased and degraded æstheticism of the present day, and he sincerely hoped his observations on that point would be laid to heart; and that those who had any influence in art circles would bring it to bear among all cultivators and patrons of art, when it might do a little to improve and rectify those matters which so much needed change.

Mr. HORSLEY, R.A., in proposing a vote of thanks to the Chairman, begged most cordially to thank Mr. Malcolm Morris for what he had said in regard to art, and assured him that as a member of the Royal Academy, he thoroughly sympathised with his views. The only exception he felt inclined to take to anything which had been said was his reference to the Exhibition at the Royal Academy, because he thought there was another Exhibition in London, where the peculiarities which had been denounced were still more strikingly manifested than in the Royal Academy.

OUR DOMESTIC POISONS.

BY

HENRY CARR, M. INST. C.E.

WITH AN APPENDIX ON

ARSENICAL POISONING BY WALL-PAPERS.

VOL. IX.—H. L.

JUNE 30TH, 1884.

LECTURE ON OUR DOMESTIC POISONS.

By HENRY CARR, M. Inst. C.E.

General COTTON, C.S.I., in the Chair.

THE CHAIRMAN said that he had been requested to take the chair in the absence of Dr. Cameron, who it was hoped would bring a Bill into Parliament making it illegal to sell arsenical papers and other arsenical fabrics for domestic use. He would merely allude to the great importance of the matter Mr. Carr was about to bring forward. Arsenical papers were much used, and few realised their dangerous character.

LECTURE.

THE injurious effects arising from exposure to arsenical fabrics, especially from arsenical wall-papers, is a subject now prominently before the public ; nevertheless it is not one easy to treat in a manner interesting as a lecture.

Public attention was first drawn to the question of the injurious effects of arsenic in domestic fabrics by Drs. Hind and Hadley, of Birmingham, about a quarter of a century ago. From that time forward, various writers have issued pamphlets, sent letters to newspapers, and have in various ways gradually given prominence to a question in which

all are so deeply interested. The late Dr. Alfred Taylor, F.R.S., took a prominent position amongst those who raised a warning voice.

No attempt, however, was made at concerted action till 1878, when the author of this paper sent a circular to a number of eminent medical men and analytical chemists. This circular was freely responded to by many, amongst whom may be mentioned Dr. Lauder Brunton, F.R.S.; Dr. Langdon Down; Professor Dupré; Dr. Farre; Dr. Habershon; Mr. Heisch; Dr. Bartlett; Professor Hodges; Mr. Jabez Hogg; Dr. Geo. Johnson, F.R.S.; Dr. Ord; Dr. George Owen Rees; Professor Roscoe; Dr. Sieveking; John Simon, C.B., late Medical Officer to the Privy Council; the late Dr. Alfred Taylor, F.R.S., and others. The information thus obtained led to the publication of 'Our Domestic Poisons,' first edition, 1879. This pamphlet was quickly followed by a paper read at the Medical Society of London by Mr. Jabez Hogg, M.R.C.S., and by the appointment of a Committee of that Society to investigate the subject from the medical point of view, Mr. Malcolm Morris, M.R.C.S., being appointed Honorary Secretary.

The next step was a lecture read at the Society of Arts by the author of this Paper, and published in their transactions, 21st January, 1880, dealing more especially with the subject "*in relation to Trade and Art.*" A Committee of that Society was then appointed, with instructions to act in conjunction with the Medical Society of London.

It appeared from the investigations of these Committees, first, that arsenic in domestic fabrics was decidedly, in many instances, injurious to health; and, secondly, that it might be excluded from all fabrics manufactured for use in this country without detriment to "trade interests;" but with regard to competition with foreigners in countries where arsenic is not prohibited, there might be a question for consideration hereafter. Lengthened and very elaborate experiments were conducted by the chemists on the Committee of the Society of Arts, Mr. Heisch, late Professor of Chemistry at Middlesex Hospital, having taken the most

active part and being the Member to whom the author is principally indebted for chemical information, though the author alone is responsible for any statements in this paper. These experiments were made in order to determine the best standard test for arsenic in domestic fabrics, a test which would allow slight indications to pass, such as arise from accidental and unavoidable contamination, too small in quantity to be considered injurious to health, but such a test as would effectually determine when that quantity was exceeded. This work was most carefully carried out.

Having determined upon the most suitable tests, no further action was taken by the Society of Arts. That Society was, in fact, too much associated with trade and manufacture to be altogether a suitable medium for action "*in restraint of trade.*" The objection to arsenic in domestic fabrics was not a trade objection ; it was solely a question of health, and therefore a question especially within the lines of the "National Health Society," which Society has from that date followed up the subject, a Special Committee having been appointed in January, 1883, with instructions to pursue the investigation, taking it up where relinquished by the Society of Arts. The medical men and analytical chemists on the Committee of the Society of Arts, together with those other members who were anxious to promote legislative restriction, joined the Committee of the National Health Society, by which means the advantage of all information previously gained was preserved available.

The evidence of injurious effects arising from arsenic in domestic fabrics appeared so clear, and the objections to its exclusion from all finished goods so slight, that application to Parliament was recommended. A Bill was accordingly drawn, and was placed in the hands of Dr. Cameron, M.P.

At an early stage important information was obtained from Berlin relating to the German laws respecting the use of arsenic in domestic fabrics. Subsequently similar information, together with a description of the chemical

test employed, was received from Sweden. The difficulties, however, experienced in obtaining reliable information from foreign countries rendered advisable an application to our own Government, requesting information generally. This request has been fully responded to, both by our own Foreign Office and by foreign countries, and the information thus obtained is now published as a Government Report,* an abstract of which is appended. From this we gather that laws respecting arsenic in domestic fabrics as stringent or more so than that now suggested for this country, already exist in Germany, Sweden, Denmark, Holland and Russia. There are also various laws on this subject in Italy, Switzerland, Austria, Servia, Roumania and Greece. It thus appears that restraint on the use of arsenic in domestic fabrics is not a novel idea now suggested for the first time; on the contrary, England is behind most other civilised countries, in respect of protection from these poisonous fabrics.

It is satisfactory to be able to report that a great diminution has already taken place in the use of arsenical colours, in consequence of the influence the agitation on the subject has had on public opinion. One manufacturer states, "that it now answers our purpose better to make goods free from arsenic;" another says, "That a manufacturer does not suffer any disadvantage from abandoning the use of arsenical colours, but the contrary, as long as the present feeling exists." This care, however, would soon cease, and arsenical colours would be again largely employed, it is to be feared, were not some permanent legal restraint imposed.

The colour of arsenical papers is an important point, and one upon which it is extremely difficult to fix public attention. The public mind is so strongly prepossessed with the term "*arsenical green*," that it seems almost impossible to root out the erroneous impression so prevalent,

* Foreign Office, No. 40 (1883) Correspondence respecting the Presence of Arsenic and other Poisonous Pigments in Wall Papers and Textile Fabrics.

namely, that green is the *only colour* to be avoided. After reading "Our Domestic Poisons," in which the following passage occurs, even one's own friends and acquaintance, from whom one might expect more attention, if not more intelligence, will betray their ignorance of the fact that colours other than green are arsenical.

The passage referred to is as follows:—"In the case of wall-papers, some greens, it is true, do contain more arsenic than other colours; but colour, whether in papers or other fabrics, is no guarantee of freedom from arsenic. It is quite a mistake to suppose that if green be avoided, there is no danger from arsenic, for arsenic in various combinations, more or less dangerous, is used in a great variety of colours, even in French white.

"In all probability arsenic, in pigments, was first used for green, and this may have given rise to the erroneous impression that it is green alone that is injurious, whereas colour is no guide whatever to the purchaser; the danger is simply in proportion to the quantity of arsenic contained in the colour and in proportion to the facility with which it may be removed from the fabric, either as dust or as gas. The public is, to a considerable extent, already alive to the danger of bright emerald green papers, but by no means so to the dangerous quality of dull greens and other colours. It is, therefore, against these that a caution is more especially needful. The expression very commonly used, '*This is not an arsenical green,*' proves that the public are not aware of the true facts of the case, and are, through ignorance, liable to surround themselves with materials highly dangerous to health."

Papers, in pairs, of similar colours, are now exhibited, the one "arsenical," the other, "non-arsenical," with two objects in view, first, to impress the eye, and it is hoped the mind also, with the fact that almost all colours may be arsenical; and secondly, that all colours may be produced free from arsenic.

As long as the use of arsenical colours is legal, paper-stainers will experience some difficulty in avoiding them,

and great care is requisite on the part of those who have determined to exclude it. Colour manufacturing is a branch of trade distinct from paper staining, the one manufacturer makes the colours, the other uses them ; it is, therefore, the colour makers who ought to be restrained. This would obviate all difficulty. Great credit is due to a few paper stainers, who led the way in producing non-poisonous papers ; the only reason for not mentioning their names is the impropriety of introducing anything here of the nature of, or that which might have the appearance of, an advertisement. These men, however, may be alluded to as having rendered great aid in pressing for prohibitory measures, this they have done by showing practically that arsenic may be excluded, and yet competition maintained in the open market, against those makers who continue to use arsenical colours.

It will be observed that wall papers are here alone dealt with as the offending fabric ; it must not be supposed from this that papers are the only injurious articles ; they are, however, the greatest offenders, and the best to use as illustration. To enter upon details regarding artificial flowers, textile fabrics for dress and furniture, toys, distemper, oil paint and arsenical artists' water-colours, would occupy too much time.

TESTING.

The process of testing for arsenic is the next point before us.* Two tests have been determined upon as suitable for the present purpose ; namely, Reinsch's and Marsh's, or rather, that modification of Marsh's test, recommended by the Chemists on the Committees of the Society of Arts and National Health.

In determining the test to be adopted there are three interests to be considered ; namely, the public, the trade, and the scientific chemists.

The public are, to a certain extent, alive to the danger.

* For detailed instructions in the use of these two tests, see Appendix.

The majority, however, are satisfied with the assurance of ordinary paper-hangers, that the papers are not arsenical—these paper-hangers, as a general rule, being shielded from intentional falsehood by their ignorance, and by that alone—nevertheless such assurances, when given without any definite knowledge, are unjustifiable. For instance, a paper sold to the writer by one of the first firms in London—printed on the back "*non-arsenical*," proved to be highly arsenical. The fact is the public desire to know whether their papers are arsenical or not, but they are unwilling to pay for the information. One's friends are glad to avail themselves of gratuitous testing, so are one's friend's friends, but when reference is given to a professional chemist, the matter is too often allowed to drop.

It is clear that if a test is to be made available for the public, it must be one that can be carried out with great facility, and one which public analysts would be bound to carry out at a small charge—this principle with regard to the fee charged is established by the Food Adulteration Act.

As regards the trade, it is also obvious that the test must be such as can be applied with great facility; the fact must also be borne in mind that the test required is not one of the most delicate—testing an arsenical wall-paper is a very different thing from a test under a judicial investigation, when a criminal's life is at stake.

It has been decided by the chemists, after mature investigation, that one thousandth part of a grain ($\cdot 001$ grain) may be allowed to pass as unavoidable and accidental contamination, when found in sixteen square inches of the fabric under examination. This quantity is arrived at from the manufacturer's point of view, not from the medical; for it would be extremely difficult, in fact impossible, to say what was the precise limit on the score of health: as regards health, one would simply say let there be no arsenic whatever, but this would involve superfluous precaution. Minute quantities of arsenic being so generally distributed in the materials of this world, it is extremely difficult to

avoid minute indications. Experience shows that manufacturers, who carefully eliminate arsenic from their works, can avoid excess above the one thousandth part of a grain in sixteen square inches of paper ; this quantity is so small that it is considered impossible to be injurious, but at the same time it is a sufficient allowance to avoid all difficulty in manufacture.

This quantity, one thousandth part of a grain, of arsenious acid will yield about 250 well-defined crystals, half-a-dozen of which, if derived from the stomach of a man, would clearly prove the presence of arsenic, though of course they would not prove that arsenic was the cause of death. Whether Reinsch's test or Marsh's be used, it is most important that the re-agents be pure—hydrochloric acid, copper, and zinc, all contain arsenic in their crude condition—but all with proper care may be obtained perfectly pure. Hydrochloric acid is used in both tests. In Reinsch's copper is also used, a small quantity, about five grains ; in ordinary cases the copper is not appreciably dissolved, but in some rare cases, the copper is liable to be dissolved to a greater extent, in which case should the copper be impure, the arsenic in the dissolved portion might be set free, and eventually be deposited on the remaining portion of the copper. Say, if two grains of copper were dissolved, the arsenic contained in these two grains might eventually appear as crystals on the microscopic slide, to this extent vitiating the result of a test by Reinsch. It is therefore important that both the acid and the copper be pure. In Marsh's test, where zinc is used, fifty to sixty grains are consumed, the dissolution of the zinc being the principle of action and occurring in every case ; any arsenic contained in this much larger quantity of zinc, must, of necessity, be set free. Thus, in Reinsch's test, the normal condition is, that the copper is not dissolved, and in Marsh's test, that the zinc is dissolved, and in much larger quantity, thus making the purity of the zinc used in Marsh's test of vastly greater importance than the purity of the copper in the Reinsch process. All the materials, however, may be,

and ought to be, obtained perfectly free from arsenic. Electric copper, deposited in very thin sheets, appears to be best for the purpose. It must be borne in mind that no copper that has been rolled or worked can be relied upon as pure, or as electric copper, even though sold as such. Thin plates of copper, direct from the electrotype bath, should alone be used. The pure and impure examples exhibited, illustrate the various coppers alluded to ; samples purchased as "pure electric copper," and as "pure copper," are proved to be very impure, but the copper exhibited direct from the electric bath, is perfectly free from the slightest trace of impurity, and may be relied upon as suitable for the Reinsch test, even though in some cases absolute purity may not be attained.

Zinc, perfectly pure, is prepared in a special manner by request, on purpose for the Marsh process ; it can be obtained from Messrs. Johnson, Matthey & Co., of Hatton Garden. Other zincs may be and sometimes are just as pure, but they cannot be relied upon without careful testing. The mode of testing adopted for zinc and acid, has been to take 200 grains of zinc, and run this with pure acid in the Marsh apparatus till the whole is consumed. This operation takes from five to six hours ; if there be no indication of an arsenical mirror the zinc is pure. For acid the process has been the same ; a pure zinc being used. Copper for the Reinsch process is tested by setting 200 grains to dissolve in pure hydrochloric acid kept at a gentle heat for some days—the diminished weight of copper gives the amount dissolved. The solution is distilled and the distillate run by Marsh ; the arsenic, if any, is carried over in the distillation, and finally deposited in the small tube of the Marsh apparatus. A variety of specimens are exhibited of arsenic obtained from ordinary trade copper ; from so-called "pure electric copper" (which has been rolled) ; from impure zinc, and from impure hydrochloric acid. Sample tubes are also shown, which remain perfectly bright after having gone through the same process with pure materials ; these details may be of some interest to those

who are not acquainted with the modes of testing, and they will enable the professional chemist to judge as to the reliability of the results arrived at by an amateur. A convenient form of apparatus for the Reinsch test is exhibited, consisting of a light frame carrying four extremely small Bunsen burners and four small flasks above—the direct flame of these small burners does not break the flasks. German glass appears to answer well, but it is perhaps safer to use Bohemian. Glass tubes for the Bunsen burners are preferable to metal—they do not heat, and the flame does not so readily pass down to the nozzle. By thus working four at a time, large numbers of tests are carried out with great rapidity, the preparation of one set being carried on while the other is boiling.

The modified Marsh apparatus requires much greater skill in manipulation; it is in fact a chemical apparatus, requiring some skill and great care. The principle of action depends on the production of a poisonous gas, arseniuretted hydrogen, which, if allowed to escape in unskilled hands, might prove highly injurious; there is also danger from explosion. The Marsh test therefore is not to be recommended, except to those who are taking the matter up in earnest for practical purposes; whereas the Reinsch process may be carried out efficiently, by any person of ordinary intelligence, if careful attention be given to the instructions prepared by the chemists on the Committee of the National Health Society; these instructions are included in the appendix to this paper. By the Marsh process the arsenic is obtained in a deposit, called a mirror, in a small glass tube, and by the Reinsch as a deposit on copper; if these deposits be sublimed on to a microscopic slide, a number of small, but very brilliant octahedral crystals are obtained, which may be recognised as those of arsenic, and as a form arising from arsenic alone; the production of these crystals is therefore proof of the presence of arsenic. The deposit on the copper or in the tube alone must not be taken as proving a material to be arsenical; as these deposits may arise from mercury, sulphur &c. It is therefore essen-

tial that these crystals be developed, before pronouncing the material to be arsenical.

In order to obtain a standard for comparison as to the quantity of arsenic obtained from a sample under examination, definite quantities of arsenic in solution are taken, say the thousandth part of a grain—the five hundredth—or other proportions—the crystals obtained from these, either by the Marsh or the Reinsch process, form a standard for comparison. If crystals, equal to those obtained from one thousandth ($\cdot 001$) part of a grain are found in a sample of material of sixteen square inches, it is allowed to pass as accidental and unavoidable contamination; but if, on the other hand, it yields crystals equal to the five hundredth part of a grain ($\cdot 002$) it shows that some decidedly arsenical material has been employed in the manufacture, and the material is condemned as containing an amount of arsenic, which due care would have excluded.

The crystals from a definite quantity of arsenic in solution are precisely the same, whether obtained by the Marsh or the Reinsch process; and in all ordinary cases it is immaterial which test be applied; but in very rare cases there is some difficulty with both tests, some ingredient in the material apparently interfering with the Reinsch and some with the Marsh. However, these special cases are not such as to affect the general result. If all the arsenic that can be detected by Reinsch be excluded, the sanitary object will be accomplished to all practical purposes.

The Scientific Chemists on the Committee of the National Health Society, report with regard to the two tests in question, that "they are fully aware of the insuperable difficulties that stand in the way of the general employment of the Marsh apparatus in ordinary business transactions. It can only be practised by experts, and the fee which they would very properly require would, in the great majority of cases, deter the public from availing themselves of their assistance, although when a prosecution was contemplated it would be otherwise. Reinsch's test, though less delicate, and indeed not absolutely free from the possibility of error,

has been proved in hundreds of comparative trials to be, when carried out as they direct, accurate enough for all ordinary practical purposes ; *i.e.*, for indicating the presence of a dangerous amount of arsenic, when no graver consequences are involved than the acceptance or rejection of a particular paper." *

MEDICAL ASPECT.

The medical aspect of this subject is that which comes home most directly to the public at large, the question that arises first will be, What are the evil effects which are supposed to proceed from arsenic in domestic fabrics? and, secondly, How is it ascertained that the arsenic is the origin of these symptoms? In reply to the first: arsenic may affect the digestive organs, the eyes, the nervous system, or the respiratory organs ; and in reply to the second question, the proof of arsenic being the cause of illness, or of a general low condition, is primarily, recovery on removal of the paper, or other arsenical fabric. But with regard to arsenical fabrics there are peculiarly favourable circumstances, facilitating satisfactory proof as to the origin of the mischief, namely, the frequent cases of recovery on removal from, and return of the malady on re-exposure to the fabric in question. It is this alternating condition which in repeated cases leaves no doubt as to the source of the malady—alternate exposure with illness and removal followed by recovery, and this repeatedly. It is perfectly true that the majority of mankind can bear exposure to arsenical fabrics without apparent injury, but so they also bear exposure to foul air, and to all kinds of infectious diseases with impunity ; were this not the case the world

* ANALYSIS OF WALL PAPER.—When sending a wall paper to be tested for arsenic, the sample must be large enough to include all colours, as some may be arsenical, others not so. In the case of small-pattern papers, a piece the size of a sheet of note paper will be sufficient to allow of part being tested, and the result written on the back of the remainder. Writing on the back is most important, in order to secure the identification of the report with the sample tested.

would soon be depopulated. The majority do survive an epidemic of small-pox, but a sufficient number succumb to make vaccination desirable. It is only a small proportion of the population that do suffer from sewer gas ; nevertheless the utmost pains is taken to exclude it from our houses ; and the same may be said of arsenical domestic fabrics, the majority do not apparently suffer, but many do, and such a proportion are affected as to make it important to exclude arsenic from our homes. Arsenical fabrics appear to produce not only clearly marked disease, but what is called "general malaise"—a low condition of the system, which is relieved on removal from the arsenical surroundings.

The following cases will illustrate what is meant by alternate illness and recovery, proving that arsenical fabrics have been the cause of illness :—

That of Dr. Hinds, who was the first to draw public attention to this question. He suffered from severe depression, nausea, pains in the abdomen, and faintness—this occurred every evening when shut up in his own study—clearly pointing to something in the study as the cause of derangement of the system. The paper was found to be arsenical, and when removed the symptoms ceased. This was a case of alternation at short intervals.

The next was one of longer intervals ; removal to the sea-side gave relief from the symptoms of arsenical poisoning ; return home reproduced them ; removal of the paper effected a cure.

A more serious case occurred in a family at Nottingham, children all healthy previous to a virulent arsenical paper being put up in the nursery, they all sickened soon after, but repeatedly recovered when absent from home, relapsing on return. One child died, but the others finally recovered, losing all symptoms of arsenical poisoning on the removal of the paper.

The following is another case illustrative of alternate illness and recovery :—An arsenical paper was put up in a gentleman's bed-room. He was taken ill four weeks

afterwards. The symptoms were remarkably complete. His medical man sent him to the sea-side, when he recovered, but on return home the old symptoms recurred; soreness of the eyes, pains at the stomach, emaciation and general malaise. The condition was serious, but recovery was effected by removal of the wall paper.

SYMPTOMS.

The following symptoms, indicating chronic arsenical poisoning, have been kindly abstracted from a large number of reports of medical men by Mr. Malcolm Morris, Honorary Secretary to the "Committee of the Medical Society of London on 'Arsenical Poisoning by means of Wall Papers, Paints, etc.'" and have been tabulated by him according to the various parts affected, and according to frequency of occurrence:—

1. *The Stomach and Bowels*:—

Diarrhoea and dysentery, pain in abdomen, nausea and vomiting, loss of appetite, thirst.

2. *The Eyes*:—

Conjunctivitis and sore lids.

3. *The Nervous System*:—

Depression of spirits, great debility, restlessness, sleeplessness, nightmare, headache.

4. *The Throat, Nose, and Respiratory Organs*:—

Soreness of throat, ulceration and dryness, bronchial catarrh, asthma, symptoms like ordinary cold in head, with much running of tears.

5. *The Skin*:—

Erysipelas, eczema, boils, and nettle-rash.

The symptoms in these four groups may all occur in one individual, or some in one group may occur with some in another. They are put in this form to show the important organs of the body that are affected by this poison.

Some well-marked cases reported by competent medical observers, as arising from arsenical fabrics, may now be given to prove this statement:—

- Case I.—Severe diarrhœa, with hæmorrhage and great prostration.
- Case II.—Intense headache, inflammation of the eyes with intolerance of light, great depression, loss of appetite with gastric irritation.
- Case III.—Restlessness, loss of sleep, malaise and headache.
- Case IV.—Irritable cough, accompanied by wakefulness, restlessness during sleep, and irritation of the eyelids.
- Case V.—Headache, nausea, and inflammation of the eyes.
- Case VI.—Nausea, vomiting, severe pain in stomach, sore mouth, thirst, tongue and gums a livid red colour, swollen, complete loss of appetite, inflammation of the eyes, and severe malaise.
- Case VII.—Extreme depression, diarrhœa, griping, and asthma.
- Case VIII.—Constant cold, sneezing, running at the eyes with redness.
- Case IX.—Violent inflammation of feet and legs recurring each time a stocking of a particular colour was worn.
- Case X.—Sore eyes, discharge from nostrils, and diarrhœa.
- Case XI.—Irritable stomach and sickness, dryness of tongue and fauces.
- Case XII.—Intense thirst at night, dry feverish skin, tongue coated in the morning, dyspepsia, diarrhœa, sleeplessness with nightmare, general lassitude.
- Case XIII.—Pain in pit of stomach, nausea, some inflammation of the eyes, irritation about throat.
- Case XIV.—Soreness of eyes, burning of the throat, eyes, and stomach.
- Case XV.—Asthma.
- Case XVI.—Diarrhœa, thirst, and exhaustion.
- Case XVII.—Tightness in breathing, dry cough, oppressed feeling in chest.
- Case XVIII.—Loss of weight and appetite, languor and depression of spirits, and pain in body.
- Case XIX.—Dryness of throat, sickness, dirty tongue,

malaise, occasionally fever, great loss of strength, want of appetite.

Case XX.—Sores on tongue and throat, and abdominal pain.

Case XXI.—Sickness, diarrhœa, severe colic, thirst, sore throat, inflammation of eyes, intolerance of light, dry cough and nettle-rash.

Case XXII.—Irritable cough, wakefulness, great restlessness, irritation of eyelids.

Case XXIII.—Want of appetite, diarrhœa, headache, soreness and stiffness of eyelids, nausea.

Case XXIV.—Loss of appetite and of flesh, nausea, griping, pain in abdomen, vomiting, diarrhœa, feverishness and thirst.

Case XXV.—Dryness of throat, malaise, headache, gastric disturbance, and sickness.

Case XXVI.—Ophthalmia of both eyes.

Case XXVII.—Dysentery, silvery tongue, dry cough, discharge from nose, extreme prostration.

Case XXVIII.—Irritation of throat and bowels, slight dysenteric diarrhœa.

Case XXIX.—Sore eyes and throat, intolerance of light, swelling of lids, headache, loss of appetite, slight diarrhœa.

A very important point, and one particularly deserving the attention of medical men, is the different results arising from arsenic taken into the stomach as a medicine, and arsenic breathed as dust, or as some gaseous combination arising from arsenical fabrics.

A most valuable illustration of this is given in the case of Dr. Lauder Brunton, M.D., Sc.D., F.R.S., who states that he threw the author's first communications into the wastepaper-basket, knowing full well that he gave as a medicine far more arsenic than could possibly be absorbed from an arsenical wall paper. It is much to be feared that Dr. Lauder Brunton is not the only one who has committed similar papers to the basket that might perhaps have been studied with advantage. The question of arsenical wall

papers was, however, brought under his notice again in a manner not to be committed to the wastepaper-basket. A dull, but highly arsenical paper, was soon afterwards hung in his consulting-room, and was quickly followed by symptoms of arsenical poisoning of such a serious character as to endanger life. This naturally drew more careful attention to the subject of this lecture, which resulted in the conversion of one, before indifferent, into a most warm supporter of the movement in favour of the prohibition of arsenical colours in domestic use. Those who are acquainted with Dr. Lauder Brunton's position in his profession will give due weight to this case.

The question how the injurious effects are produced by arsenical colours in our domestic fabrics is a moot point, some thinking that it arises from arsenical dust, others holding to the gaseous theory. Probably both may be the cause of disease, each acting according to the peculiar circumstances of the case. The question between dust and gas is in some respects important, but as regards the public, in a case of illness, it is of little consequence whether dust or a gas, which may arise from a combination of arsenic with organic matter, has been the injurious agent; in either case the arsenical fabric causing the mischief ought to be got rid of. The presence of arsenical dust in a room with an arsenical paper is easily proved. Take a piece of rag the size of one's hand, wipe the top of furniture, pictures, &c., then test the dusty rag, and arsenic will be found. A case in point was that of the son of a gentleman connected with the Society of Arts Committee. The boy was ill, the symptoms indicating chronic arsenical poisoning. Arsenic was found in the paper, and in the dust of the rooms. The paper was removed, and the symptoms of arsenical poisoning disappeared.

With regard to the gaseous combinations of arsenic, we have the authority of Dr. H. Fleck, of Dresden, who thus reports on his experiments: "Unmistakable cases of poisoning have arisen from inhabiting rooms hung with arsenical wall-papers, where, on account of the character of

the paper, or for other reasons, it was impossible to ascribe the poisonous effects to portions of the colouring matter mechanically detached. For this reason, and because in certain cases the odour of garlic had been noticed in rooms thus papered, it was long suspected that there was actually generated, under some circumstances, arseniuretted hydrogen.

"Experiments were made on a paper coloured with Schweinfurt-green, an aceto-arsenite of copper. Starch paste was used to fix the colouring matter on the paper, and also to fasten the paper to the inside of a large tubulated bell-glass.

"The bell-glass thus lined, and while the paste was still moist, was placed upon a well-ground glass plate; the bell-glass was hermetically closed, and the apparatus was left to itself for three weeks. A growth of mould appeared between the paper and the glass sides, and the air within the jar acquired a musty odour. At the expiration of the three weeks, a slow stream of air was passed through the jar, and the presence of arsenic was shown conclusively in the air, as it issued from the apparatus. The arsenical compound thus present in the air, gave, with a solution of salt of silver, the ordinary reaction of arseniuretted hydrogen. A similar experiment, in which was employed a flask, coated on the inside with a mixture of gelatine and Schweinfurt-green, gave a similar result. It was found that a mixture of arsenious acid and starch paste gave rise to the formation of arseniuretted hydrogen; but no arsenic could be detected in air which had been in contact with a mixture of arsenious acid and water without the presence of any organic material."

From these and confirmatory experiments, Dr. Fleck concludes that there can no longer be any doubt of the possible presence of arseniuretted hydrogen in the air of a room hung with paper which is coloured with Schweinfurt-green; that the evolution of this gas takes place on account of the joint action of moisture and of organic matters (especially such substances as are used in fixing the paper to the

walls); and that wherever free arsenious acid is in contact with organic substances, the evolution of the gas is possible. The danger, then, is by no means confined to Schweinfurt-green, but may arise from any colour which contains arsenic.

Professors Roscoe and Schorlemmer express a confirmatory opinion, as follows, in their "Treatise on Chemistry," Vol. I., p. 518:—

"Hydrogen is evolved during the growth of mould and certain fungi, and it is possible that if arsenic compounds are present where such growths are going on, arseniuretted hydrogen may be evolved. This may perhaps explain the evil effects noticed when arsenical wall-papers are employed. At the same time, it must be remembered that in those cases arsenic doubtless finds its way into the system in the form of dust, which in such rooms invariably contains it."

Finally, the question to be considered is the advantage and disadvantage connected with the use of arsenical colours—a question of colour and price. As regards colours, the examples exhibited clearly show that, practically, there is no occasion to employ arsenic for the production of the desired shade of colour; and the fact that manufacturers, who faithfully exclude arsenical colours, can compete in the open market with others who do use them, settles the question of price.

The gain and the loss must always be taken into account together; sometimes exposure to injurious influences cannot be avoided; sometimes the gain may fully counterbalance the loss. Where fashion requires that the person should be so restrained within reduced limits, or so decorated as to injure the health, there is a great object in view, namely, to be fashionable. But whether the object so attained should be looked upon as a gain, as on the whole a benefit, or whether it be as St. Paul expresses it, a "gain of harm and loss," is a matter of opinion for the consideration of each individual; but with regard to arsenical colours there clearly is no gain to counterbalance the injury to health.

APPENDIX.

ARSENICAL POISONING BY WALL-PAPERS.

BEING EXTRACTS FROM THE REPORT OF THE NATIONAL HEALTH SOCIETY, 1883.

Chemical Test to be employed.—The first point for consideration is whether the prohibition of arsenic must be absolute, extending to the most minute trace, or whether such minute quantities may be allowed as arise from accidental and unavoidable contamination. A very large proportion of fabrics of all kinds are found absolutely free from arsenic, no known test discovering the slightest trace; but, again, with regard to many fabrics, some traces are unavoidable in consequence of the very wide diffusion of small quantities of arsenic in natural products. The consideration consequently arises: first, as to what amount of arsenic it is requisite to allow as unavoidable and accidental contamination, in order that trade may not be hampered or interfered with to any undue extent; and next, whether that allowance may be permitted with due consideration to health. There are manufacturers of wall-papers (the principal articles in question) who have, on principle, abjured the use of all arsenical colours; the result of their work affords, therefore, an excellent guide for what may be demanded without unreasonable interference with the freedom of trade. An examination of a very large number of papers, supplied by these manufacturers, leads to the conclusion that an allowance of half a grain of arsenic per "piece of paper"—a piece being 12 yards in length and 21 inches wide—would be ample for accidental and unavoidable contamination; and this quantity, it is considered, would not be injurious to health. It is found that a suitable size for a sample to be tested is 16 square inches, to be cut from one part; or, if thought well, from several parts of the pattern, so as to include all the colours. The proposed limit of half a grain per piece gives $\cdot 001$ grain per sample of 16 square inches. For ordinary uniform materials, a square of 4 inches by 4 inches may, therefore, be taken as the portion to be tested.

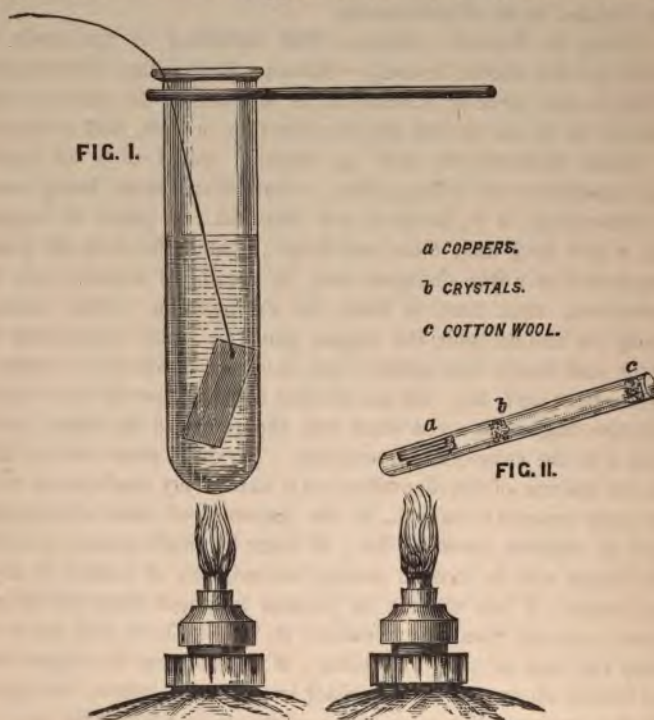
REINSCH'S TEST.

The advantages are that it can be undertaken by any professed chemist at a fee within the means of everyone, no small consideration when a large number of papers have to be examined, indeed, with the apparatus provided at the suggestion of the Society by Messrs. Townson and Mercer, 85, Bishopsgate Street Within, London, manufacturers, tradesmen, and intelligent householders might use it for themselves.

They thus hope that the end they have in view, the discouragement of the employment of arsenical colours, would be more speedily attained by the education of the public generally, than a few isolated cases of prosecution.

Testing by Reinsch's Process.—The following is the mode in which this test should be used:—Sixteen square inches of the paper, either in one piece or several, so as to include all parts of the pattern, to be cut up and put in a test-tube or flask, with 2 ounces of dilute hydrochloric acid (4 distilled water to 1 of acid), and brought to the boiling point, a vertical condenser being used, if convenient; it is, however, not essential. A piece of copper foil, 1 inch by $\frac{1}{2}$ inch, clean and bright, is now placed in the flask, suspended by a thin platinum wire, by means of which it can be withdrawn, from time to time, for examination. After boiling gently for half an hour, the copper must be rinsed repeatedly in water, and finally held under a tap, in a pair of forceps, to remove all traces of acid, &c. On no account is the copper to be touched with the fingers, as, even when wet, the grease of the finger interferes with the subsequent operations. No great stress can be laid on the amount of discolouration, as it varies very much, even with the same amount of arsenic, in the presence of other substances, such as sulphur, mercury, &c. If there be much arsenic present the copper will be coated almost immediately of a *black* or *dark steel* colour; if less arsenic be present a longer time will be required, varying from half a minute to half an hour, half an hour being the limit of time for boiling; if in that time the copper be not coated all over of a lamp black or dark steel colour, the paper may be accepted, the cases being very rare in which this process does not detect the arsenic. If the copper be coated all over, the paper is in all probability arsenical. The copper must then be treated as follows:—Dry it between two pieces of clean blotting-paper, and, holding it in the forceps, warm it very gently over a spirit-lamp; then, still holding it in the forceps, cut it into strips.

Take a thin glass tube, $\frac{1}{4}$ inch internal diameter, and $1\frac{3}{8}$ -inch long, sealed at one end, and lipped like a test-tube at the other. Suspend this by dropping it through a hole cut in a piece of stout sheet-brass or copper, not less than 4 by 1 inches, so that the lip just supports the tube, and place the brass or copper plate on the ring of a retort-stand. Heat the tube nearly to redness, to expel the last trace of moisture; and, when cold, put the copper strips within, and place over it, resting on the mouth of the tube, a microscopic slide, warmed in a spirit-lamp till all the moisture at first deposited has disappeared. Now heat the tube with the spirit-lamp, letting the flame play on the under side of the brass plate. In a few seconds, a sublimate will appear on the slide. Watch this until it



begins to shrink from the edges and form a patch just the size of the bore of the tube. Remove the lamp, allow the slide to cool, and examine the sublimate with a magnifying power of 220 diameters. If the sublimate consist of octahedral crystals, the discoloration of the copper is due to arsenic.

Or the crystals may be obtained by using a tube about 3 inches in length as shown in the above figure.

MARSH'S TEST.

No paper should be passed as "non-arsenical," unless, when treated as hereafter described, it fails to yield a mirror in a tube $\frac{1}{8}$ inch internal diameter, sufficient to cut off at any point a black line on a white ground, technically known as thick rule (eight to pica).

Specimen Line.

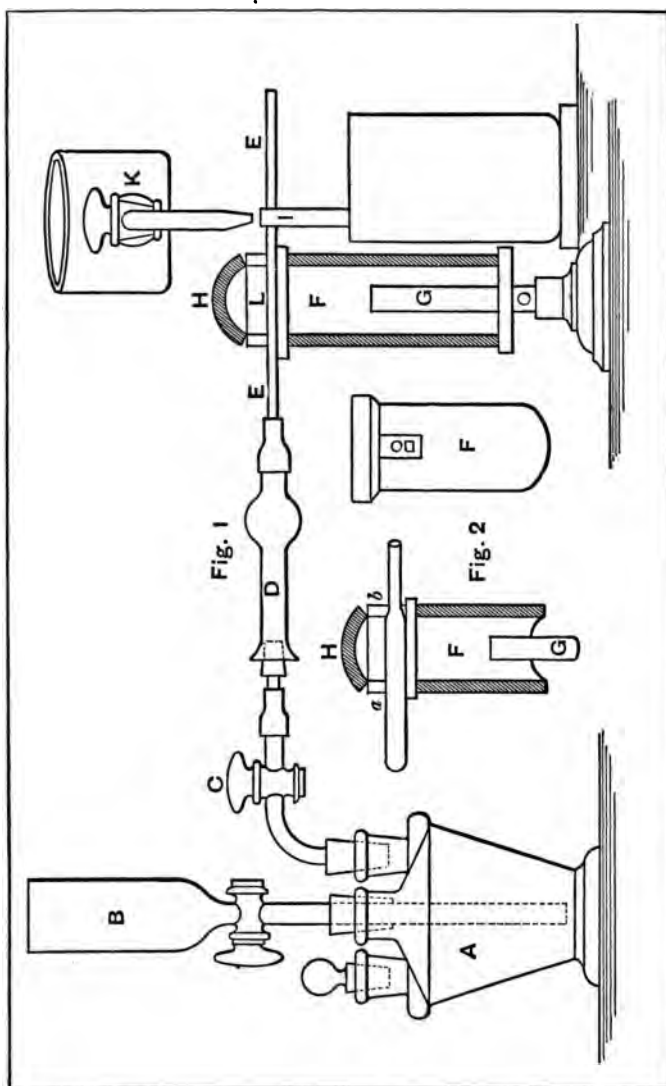
In a three-necked bottle * of the form A, Fig. 1, of about 10 ounces capacity, place 200 grains of pure zinc.† To the centre neck, fit a tube funnel and stop-cock, B, and to one of the side necks a right-angled tube, and stop-cock, C. The third neck should be closed with a ground stopper. Connect with C a chloride of calcium tube, D, and with this a tube of hard glass, E, $\frac{1}{8}$ -inch internal diameter, and about .04 inch thick in the glass, if the paper or other material to be tested does not contain sulphur; but if, on being treated with hydrochloric acid, it yields sulphuretted hydrogen, the modification of this tube E, hereafter mentioned, must be adopted. Let this tube traverse a clay chimney, F, $1\frac{3}{4}$ -inch diameter, and 6 inches high, in the top edges of which two slots have been filed to admit E, to the depth of one inch, and let E be supported on a thin bridge of the same material as the chimney, $\frac{1}{4}$ -inch wide and a $\frac{1}{8}$ -inch thick slightly notched, to rest on the sides of the chimney. This chimney surrounds a Bunsen's burner, G, of $\frac{1}{2}$ -inch diameter. Over the top of the chimney, place an arched cover, H. Round E, at $\frac{3}{8}$ -inch from the chimney,‡

* This form is recommended, as in case of frothing, which frequently occurs, the froth is not driven into the tubes.

† Zinc sufficiently pure for this purpose can only be prepared by dissolving the purest commercial zinc in pure acid, so as to expel any arsenic as arsenuretted hydrogen; precipitating the zinc with pure carbonate of soda, washing the precipitate, and, when dry, reducing it. Messrs. Johnson and Matthey, of Hatton Garden, prepare zinc exactly in this manner, and supply it in bars, guaranteed free from arsenic. This zinc gives off hydrogen so freely, that it is desirable to have the requisite quantity in one piece in the bottle, so as not to expose too great a surface to the action of the acid.

‡ The chimney is conveniently made by cutting the bottom off a Daniell's porous cell, and the cover by cutting a piece $1\frac{3}{4}$ inch long off a similar cell and splitting it into three. The bridge also is best made of the same material.

roll a strip of thick blotting-paper or calico, $\frac{1}{4}$ -inch wide, secured by a thread, as at **x**. This should go at least twice round the



tube, and hang down, as shown in Fig. 1; on to this, water is dropped from a bottle, **K**, at the rate of about 120 drops per minute (in very hot weather even faster). When the apparatus is

thus arranged, pour through B two ounces of dilute hydrochloric acid, one part acid to eight water. If any sample of zinc do not yield hydrogen with sufficient rapidity with this acid, slightly stronger must be employed. The hydrogen should be evolved with sufficient rapidity to keep alight at the end of the tube when fired. Close stop-cock on B, and let hydrogen escape through C, D, E, till all air is expelled. Now light G, and when E is quite red-hot, close C, and introduce through the stoppered neck the 16 square inches of paper, cut into strips of one inch by two inches, and rolled up so as to pass readily through the neck. This must include within the 16 square inches of paper portions of every part of the pattern, so that all the colours may be tested. Replace the stopper, open stop-cock C, and let the action continue for one hour. Now, extinguish G, and observe if a brown or black mirror be formed in E, between I and the chimney. If no mirror be formed, the paper is absolutely free from arsenic; if a mirror be formed, which, if the operation be properly conducted, will occupy about $\frac{3}{8}$ inch in the tube, lay E along the black line before spoken of, in front of and pointing towards a window, and observe, with one eye exactly over the tube, whether at any point the mirror be thick enough to obscure the line. Should this not be the case, the paper may be passed as containing no more arsenic than may have got into it from unavoidable causes; should the line be at any point obscured, it only remains to make sure that the mirror is arsenical. If, when sublimed with access of air, the mirror yield octahedral crystals, it is arsenical. This operation is best performed as follows. The portion of the $\frac{1}{8}$ -inch tube containing the mirror being cut out, take a thin hard glass tube, $\frac{1}{8}$ -inch internal diameter and $1\frac{3}{8}$ -inch long, sealed at one end, and lipped like a test-tube at the other. Suspend this by dropping it through a hole cut in a piece of stout sheet-brass or copper, not less than four by two inches, so that the lip just supports the tube, and place the brass or copper plate on the ring of a retort stand. Heat the tube nearly to redness, to expel the last trace of moisture; when cold, insert the portion of the $\frac{1}{8}$ -inch tube containing the mirror, and place, over the mouth of the tube and resting on it, a microscopic slide, warmed in a spirit-lamp till all the moisture at first deposited has disappeared. Now heat the tube with the spirit-lamp, letting the flame play on the under side of the brass plate. In a few seconds, a sublimate will appear on the slide. Watch this till it begins to shrink from the edges, and form a patch just the size of the bore of the tube. Remove the lamp,

allow the slide to cool, and examine the sublimate with a magnifying power of not less than 220 diameters. If the sublimate is found to consist of octahedral crystals, it is arsenical. Such crystals are well shown on the photographs taken by Mr. J. H. Jennings, of 14, Beach Avenue, Nottingham.

If, on being treated with hydrochloric acid, a paper or other substance yield sulphuretted hydrogen, as before mentioned, or if, on being treated as above described, a yellow or whitish-yellow sublimate be found instead of a mirror, the following modification must be adopted.

Substitute for the tube *a* a tube of $\frac{1}{4}$ -inch diameter, having the $\frac{1}{8}$ -inch tube sealed on to its end (Fig. 2); at *a*, the junction of the two, place a small plug of asbestos; fill the portion which traverses the chimney with a mixture of dry carbonate of soda and charcoal; and behind this, at *b*, place another plug of asbestos. The rest of the arrangement is the same as in Fig. 1. The red-hot carbonate of soda and charcoal retain any sulphur, &c., but permit the arsenic to pass. In this case, a little water is formed, and carried forward with the arsenic, which prevents the mirror having such well-defined limits as when it is perfectly dry; but a few experiments, made with known quantities of arsenic, will enable the operator to say with accuracy if a paper contain more than the permitted maximum of arsenic. It is remarkable how small a quantity of sulphur will completely mask a considerable amount of arsenic. Thus, sufficient ultramarine, mixed with a white pigment to give it a greyish tint, will quite prevent the formation of an arsenical mirror with four times the maximum quantity of arsenic permitted.

In the case of textile fabrics to be worn next the skin (as gloves, socks, or vests), experience has shown us that no trace of arsenic, however small, should be permitted. Curtains, carpets, &c., come under the same rule as wall-papers. In the case of carpets, it is better to remove the hempen backing on which they are frequently made up, and only to put the wool into the bottle. Some textile fabrics will not yield up their arsenic without previous maceration in strong acid. It is, therefore, desirable in all cases to submit the material to the action of pure hydrochloric acid, sufficient thoroughly to saturate it for a period of at least twelve hours previous to testing. When commencing to test, water should be added to dilute the acid. Textile fabrics should also be submitted to the action of zinc and acid for a longer time than papers; and it is safer, when the first portion of acid has nearly ceased to act,

to add a quarter of an ounce strong acid through B, and let the action proceed for a second hour.

Articles in which Arsenical Pigments are used.—Paper, fancy and surface-coloured ; in sheets ; for covering cardboard boxes ; for labels of all kinds ; for advertisement cards ; for playing cards ; for wrappers and cases for sweetmeats, cosaques, &c. ; for the ornamentation of children's toys ; for covering children's and other books ; for lamp shades ; paperhangings, for walls and other purposes ; artificial leaves and flowers ; wax ornaments for Christmas trees and other purposes ; printed or woven fabrics intended for use as garments ; printed or woven fabrics intended for use as curtains or coverings for furniture ; children's toys, particularly inflated India-rubber balls with dry colour inside, painted india-rubber dolls, stands and rockers of rocking-horses and the like, glass balls (hollow) ; distemper colour for decorative purposes ; oil paint for the same ; lithographic colour printing ; decorated tin plates, including painted labels used by butchers and others to advertise the prices of provisions ; japanned goods generally ; Venetian and other blinds ; American or leather cloth ; printed table baizes ; carpets ; floorcloth ; linoleum ; book cloth and fancy bindings.

REPORT ON EVIDENCE REGARDING THE INJURIOUS EFFECTS
ON HEALTH ARISING FROM ARSENICAL WALL-PAPERS
AND OTHER ARTICLES CONTAINING ARSENIC.

By T. LAUDER BRUNTON, M.D., F.R.S.

THE evidence on this subject consists partly of articles published in various journals, and partly of answers to a circular on the subject sent out by the Medical Society of London (see BRITISH MEDICAL JOURNAL, February 21st, 1880). The nature of the evidence is, first, that certain symptoms have occurred in persons exposed to the influence of certain conditions ; secondly, that, on attempting to analyse these conditions with the object of finding out the cause of injury, none could be discovered at all likely to produce the symptoms, except arsenic ; thirdly, that the symptoms coincided in many respects with those produced by arsenic when administered internally ; fourthly, that the symptoms disappeared when the arsenic was removed, although, as far as could be ascertained, the other conditions remained unaltered. The number of cases on which the report of the Committee of

the Medical Society of London was based was a little over one hundred ; and, besides these, numerous cases have been reported in medical journals. Considering the extensive use of arsenic in wall-papers and articles of clothing and furniture, the number of cases may appear very small, and quite insufficient to prove the necessity for any form of legislative interference. This objection, we believe, however, to be invalid. It is exactly the same in kind as that which may be brought against interference with systems of drainage which contaminate drinking-water with typhoid excreta, or against the free distribution of milk supplied from dairies where typhoid or scarlet fever exists. The comparative smallness of the number of cases of poisoning by arsenical wall-papers is, we believe, simply due to ignorance of the injurious action of arsenic in papers, dress, or furniture, and consequent failure to perceive the connection between the illness and its cause. One circumstance which renders this connection more easily overlooked, is the fact that all persons are not equally susceptible to the injurious action of arsenic. It is well known that, in Styria, many persons are accustomed to take quantities of arsenic which would be fatal to others unaccustomed to it. It seems possible that the same may occur with arsenical papers ; for, in a house at Hampstead, where the former occupants had enjoyed good health, another family, shortly after their entrance, began to suffer from symptoms of arsenical poisoning. The wall-paper was examined, and found to be arsenical. On its removal, all the symptoms ceased. The immunity which the first of these families enjoyed, although exposed to the action of the arsenical paper, may have been due to their having become gradually inured to the presence of arsenic ; but it may also have been due to a less degree of sensitiveness ; and this is all the more probable, because the second family have suffered three several times in the same way. Should one member of a family be more sensitive than others, he or she may suffer while the rest escape. In such a case, suspicion will be averted from the arsenical paper, as all have been exposed to its influence. In one case reported to the Medical Society, two children of an eminent consulting surgeon died from enteritis, while the nurses escaped. The cause of the illness and death of the children was a mystery, until the nursery papers were examined and found to contain arsenic. Another cause of the failure to connect the symptoms due to arsenic with its presence in wall-papers is, that the symptoms are those of irritation of the intestinal or respiratory

tracts, or of the conjunctiva; and these may frequently be attributed to other causes than the true one, especially if no suspicion of the presence of arsenic be entertained. Thus, in thirty-five cases reported to the Medical Society, nausea, diarrhoea, and digestive disturbance occurred; and these symptoms might be ascribed to errors in diet, to chills, to imperfect drainage, or to worry or overwork; or might be vaguely ascribed to constitutional disturbance by those who did not suspect, and therefore failed to discover, the true cause. The same may be said of the cough and asthma which occurred in nine cases, or of the conjunctivitis which occurred in nineteen. In support of this view, it may be mentioned that one-fourth of the cases of poisoning reported to the Medical Society had occurred in the persons of the medical men themselves who reported them, or in members of their families; and that a large proportion of the cases reported had been observed by men qualified in an especial way, either by knowledge or by training, to discover the true cause of the symptoms which occurred.

Another reason why arsenic as a cause of disease is overlooked, is, that when given as a medicine, it produces no injurious action in quantities which are probably larger than those which enter the bodies of persons exposed to the action of arsenical papers. The reason of this may be twofold: either it may be that the arsenic given off from the paper is absorbed by the lungs instead of the stomach, or it may be that the arsenic is given off from the paper in a specially poisonous form. The difference between the effect of poisons taken by the mouth and introduced into the body in other ways, is shown by the fact that the venom of vipers, although very poisonous when applied to a wound, is quite innocuous when swallowed. That arsenic, in different combinations, has different poisonous powers, is shown by the fact that, cacodylic acid, which contains a large percentage of arsenic, is not poisonous; while, on the other hand, arsenic, in the form of arsenes, appears to be more poisonous than arsenious acid.

At all events, however, a considerable amount of positive evidence has already been obtained of the injurious action of arsenical papers and fabrics; and, whatever may be the reason why it is not greater, it is sufficient to justify vigorous action in the matter.

ON THE BEHAVIOUR OF ARSENIC IN CONTACT WITH
PUTREFYING ORGANIC SUBSTANCES.

By THOMAS STEVENSON, M.D.,

Professor of Toxicology, Guy's Hospital.

It has now for some time been a well-established fact that nitrogenous organic substances, *e.g.*, flesh, give rise during putrefaction to the formation of alkaline or basic substances. Ammonia is the best known of these products. There are, however, other and less known bases, or alkaloids, as the organic bases are termed, also produced during decay, *i.e.*, substances formed, as the chemist terms it, on the same type as ammonia. Two chemical bodies are said to be of the same type when they contain the same number of atoms, or groups of atoms (compound radicals), arranged in the same manner. Thus bodies so diverse as water and alcohol are said to belong to the same type, because one of the two atoms of hydrogen contained in the molecule of water in alcohol is replaced by a group of atoms of carbon and hydrogen, known collectively as ethyl; and water and alcohol, regarded in some aspects, have similar chemical properties. Ammonia, abundantly produced during putrefactive decomposition, is itself the type of organic bases (alkaloids), among which are such beneficent substances as quinine, and such destructive bodies as strychnine and aconitine. Trimethylamine, a base which may be regarded as ammonia in which the three atoms in its molecule have been replaced by three groups of the atoms collectively spoken of as methyl. The class of bases formed on the ammonia type, by substitution, are termed *amines*. But not only may the hydrogen atoms of ammonia be thus replaced by such groups of atoms as methyl, but even the fourth atom of the ammonia molecule, nitrogen, may be also replaced by an atom of a different character. Thus by substituting for the nitrogen atom in ammonia and compound ammonias (amines) an atom of arsenic, a series of basic substances is obtained, termed *arsines*. In this way we have the well-known deadly gas arsenuretted hydrogen (arsine *par excellence*), which is a compound of one atom of arsenic with three atoms of hydrogen, just as ammonia is a compound of one atom of nitrogen with three atoms of hydrogen. Numerous arsines can be prepared by the chemist, and they are frightfully poisonous substances.

During the last quarter of a century, attention has been drawn to the occasionally poisonous character of substances obtained by

putrefaction. Panum first obtained from these a poison which acted as a ferment. The present writer, in conjunction with Dr. Fagge, also showed that various dead animal substances extracted with alcohol acted as poisons. Bergmann went further, and described, under the name of sepsine, an alkaloid generated by putrefaction, which acts as a septic poison producing a kind of blood-poisoning or pyæmia.

Still more recently the subject has been developed, chiefly by the labours of Professor Selmi of Bologna; and numerous alkaloidal products of decay have been obtained and made the subject of physiological experiment. To these alkaloidal products of putrefaction and decay the terms "cadaveric alkaloids" or "ptomaines" (*πτῶμα*, a corpse) have been applied. Some of these bodies are poisonous, whilst others are innoxious. Unfortunately, the descriptions of these bodies given by foreign writers are usually vague, and the doses employed appear to have been indefinite. MM. Gautier and Étard have, nevertheless, endeavoured to elucidate their chemical composition, and have endeavoured, with some success, to show the analogies between the cadaveric alkaloids and the basic substances obtained by acting artificially upon albuminous substances with baryta and the alkalis.

Naturally enough, the well-known analogies existing between the amines and the urosines—bodies, as we have already seen, formed on the same ammonia type—led to the supposition that arsenic, when absorbed into the system, and arsenic when present in putrefying animal matters, might give rise to poisonous arsines; and Professor Selmi's researches point to the formation of such bodies. This observer examined the urine of animals whilst they were being poisoned with arsenic, and found in this secretion arsenic, not only in the ordinary form of an arsenite or arsenate, but also as a volatile basic compound of arsenic—an arsine, in fact. Selmi has, moreover, found in the corpses of persons who have died from arsenical poisoning, as well as in anatomical preparations preserved by means of arsenic, poisonous arsenical bases, one of which, though volatile, is stated to have a strychnine-like physiological action.

The existence of these volatile arsines may serve to throw light upon the anomalies attending the use of arsenical wall-papers. It is well known—and has hitherto not received any satisfactory explanation—that some highly arsenical wall-papers have been used without manifest injury to health; whilst others, on the other

hand, though containing much less arsenic, have produced distressing results. It may be that in the one case volatile arsenical bases have been formed, and not in the other. The fact that the frequenters of dissecting-rooms, where bodies are injected with preparations of arsenic, do not suffer from arsine-poisoning is, however, adverse to the theory of the formation of these bodies under the influence of putrefaction, unless in very exceptional cases.

Our readers have doubtless heard tales of secret poisoners in the Middle Ages, and how *aqua tofana* was employed by these persons for their nefarious purposes. Possibly, the formation of the arsenical ptomaines may throw light upon the constitution of this well-nigh fabulous liquid, the potency of which toxicologists of the present age have been prone to doubt. It is a matter of tradition that *aqua tofana* was prepared by sprinkling white arsenic upon pieces of pork, and collecting the liquid that drained from these; the juice of a kind of toadflax being also added. Now, the volatile arsenical ptomaine which Selmi has described as acting like strychnine was prepared in this very manner. We can, then, well understand how from arsenic a liquid may have been prepared, highly poisonous, yet totally differing from arsenic itself in the symptoms resulting from its administration. Selmi's discovery needs confirmation and further elucidation; but it may be that the Italian professor has rescued *aqua tofana* from the category of myths, and that, in a not distant future, toxicologists may have to deal with a whole class of new alkaloids. It need hardly be said how important the ptomaines are from a forensic point of view; but it does not fall within the scope of the present article to point out how they may be recognised under circumstances in which their presence might be mistaken for that of the poisonous natural vegetable alkaloids.

LAWS RELATING TO DOMESTIC POISONS IN FOREIGN COUNTRIES.

Before drafting a Bill to restrict the employment of arsenic in British manufactures, the National Health Society deemed it advisable to ascertain what restrictions, if any, had been imposed in other countries on the use of arsenic and other poisonous pigments in the tinting of wall-papers and various textile fabrics for industrial and decorative purposes, and in painting toys. For this end they applied to Earl Granville, who, in a most courteous

reply, undertook to obtain from the agents of the Foreign Office the required information, both in respect of national laws and of local or municipal regulations. Answers have been received and transmitted to the Society from nearly every European State.

As regards Germany, it may be well to explain the relations subsisting between the several States and the Federal Empire of which they are members. The difference between imperial and local legislation is clearly comprehended in Germany. The parliaments and other legislative assemblies of the individual States are not merely administrative bodies, but legislate on all matters of local interest, and on such matters of general importance as have not been dealt with by the Reichstag or Imperial Parliament; while the latter confines its attention to questions equally affecting the whole empire. It thus frequently happens that a law which has been in force for many years in one or more of the States, and has been found to work advantageously, is made the basis of an imperial law, or even accepted entire by the Reichstag.

There are, besides these, other enactments, closely corresponding with our "Orders in Council," issued by the Emperor with the advice and consent of the Bundesrath (a body of fifty-nine members, appointed annually by the governments of the several States). These orders must be laid before the Reichstag or Imperial Parliament, if sitting, or, if not, at its next meeting. The House can approve or reject them as a whole, but cannot amend or alter them; and, if approved, they have the force of imperial laws. Though Parliament cannot itself alter them, the Council will often do so in deference to the strongly expressed wish of the House.

With these preliminary explanations, we will proceed to an examination of the imperial and local laws which have been communicated to us.

The Imperial Law of May 14th, 1879 (No. 1293), is couched in general terms, and deals with the adulteration or falsification of food and drink, the sale of diseased or unwholesome meat, and of dangerous petroleum, and also regulates the manufacture and sale of all articles of domestic use, of whatever kind, likely to affect injuriously the health of individuals. By this law, the police are authorised to enter all places where such are manufactured or sold, and to take samples for examination or analysis, on certain conditions as to payment and the identification of the

article. Local regulations of a more stringent character are not interfered with. Section 5 leaves it to the Emperor and Council to issue orders from time to time prohibiting the use, for any particular purposes, of such colours, substances, &c., in the preparation or packing of the articles in question as may be deemed injurious to health, and to forbid the employment of any process or mode of manufacture calculated to produce such effect.

A graduated series of penalties is laid down, beginning with fines not exceeding 150 marks, or equivalent terms of imprisonment, for the least violation of the provisions of the Act, even if this be the result of pure carelessness. The offender is subject to a fine not exceeding 1500 marks, or to imprisonment, to which may be added loss of civil rights, and subjection to police surveillance, for adulteration of food. The penalty rises, imprisonment, without option of fine for knowingly introducing any poisonous or noxious substance, and penal servitude for not more than five years if any grievous bodily harm follow such introduction, or not exceeding ten years if such mixture be made with knowledge of the probable result, and for not less than ten years, or even for life, if death actually follow as the consequence.

In accordance with Section 5, His Majesty the Emperor issued an order, on May 1st, 1882, specifying the colours which should be deemed poisonous and prohibited in the case of all articles of food and drink. Section 2 of this order forbids the use of the same in the covering or packing of such articles. Section 3 extends the same prohibition, excepting as regards zinc oxide and lead chromate, to the painting and colouring of toys.

Section 4 forbids the use of colours "prepared with arsenic," and of "copper colours containing arsenic," in paper-hangings and materials of dress. Section 5 prohibits the sale of all articles prepared, kept or packed in contravention of any of the preceding provisions.

The order was to come into operation on April 1st of the present year.

When this order was submitted to the Reichstag on December 13th, 1882, the House, apprehending certain difficulties in its application, referred it to a special committee for further consideration. The committee presented their report on February 8th, 1883, in which they recommended that Sections 2 and 3 should, for the present, be suspended, since their enforcement would affect injuriously the German trade in toys, with countries where

no such restrictions existed. At the same time, they expressed a hope that the Chancellor would enter into negotiations with other governments, with the aim of coming to an international agreement as to which colours should be held to be poisonous and unsuited for this purpose.

Section 4, which was none other than the law already in force in Prussia since 1854, met with almost unanimous approval, especially the choice of the expression, "prepared with arsenic," in place of "containing arsenic," since it would have the effect of guarding against the danger following the use of arsenic in the preparation of those anilin colours which, though harmless in themselves, are rarely free from it as sold; while, on the other hand, it would not bring the presence of minute and unavoidable contamination by arsenic within the action of the law. One member alone, in a full house, dissented, urging the case of fuchsin, a non-poisonous colour, always prepared by means of, and, as he admitted, seldom, if ever free from arsenic. The suspension of the Sections 2 and 3 was therefore desired by the House, and assented to by His Majesty and Council. The use of Scheele's green and of other arsenical colours for wall-papers and clothing had been prohibited for many years, not only by the laws of Prussia, but by those of nearly every minor State; but these restrictions were at first found to operate injuriously on the Prussian export trade in paper-hangings, by placing the manufacturers under an unfair disadvantage when competing with those of such countries as France, who were under no such restrictions; and at their representation an order was issued on December 29th, 1854, permitting the use of arsenical colours in wall-papers intended for exportation only, provided that such papers be prepared and stored in separate buildings and entered in separate order-books, at all times open to inspection by the police.

Very little use has, however, been made of this permission, German manufacturers having found green colours equally applicable, and perfectly free from arsenic.

Anilin works are regulated by an order of the Ministry of Commerce dated June 10th, 1865, by which permission to establish them is granted, only on condition that all arsenic and refuse containing arsenic be kept in separate locked and well-paved rooms; that all operations with arsenical solutions be performed in chambers provided with waterproof floors and courses, and drained into a water-tight reservoir beneath the same; that all

refuse liquor containing arsenic be evaporated down in a suitable apparatus, and conveyed to such places as the police may approve; that a poison-book be kept, containing full details of the purchases of arsenic and the disposal of arsenical waste; and that, except by special permission, the arsenic acid employed shall not be prepared on the premises.

These restrictions and precautions have turned the attention of the manufacturers to the search after reduction-processes by means of other reagents; and three of the largest firms in Germany—the “*Bädische Anilin und Soda-Fabrik*” in Ludwigshafen, the colour-works at Höchst am Main, and the “*Actien Gesellschaft für Anilin Fabrikation*” in Berlin—make anilin colours, as magenta, fuchsin, and rubin, entirely without the use of arsenic.

The Imperial Law of May 14th, 1879, supplemented by the Order in Council, which, as amended came into operation on April 1st of this year, has superseded all local regulations.

In Sweden, the question of arsenical colours has been the cause of much discussion at home, and of negotiations with the Governments of other countries. The ordinance of 1876, which regulated the manufacture, storage, and sale of poisons of all kinds, unconditionally prohibited the use of arsenic in wall-papers, blinds, cloth, artificial flowers, and wares of all kinds “printed or painted in water-colours;” as well as in lamp-shades, sealing-wax, wafers, and candles. A Royal decree amended the clauses of the ordinance of 1876 referring to arsenical goods, removing textile fabrics to the second category, and fixing a limit of permissible impurity—viz., that the metallic arsenic deposited in a glass tube of $1\frac{1}{2}$ to 2 millimètres internal diameter, from 440 square centimètres, of articles in the first list (wall-papers, &c.), or from 220 square centimètres of textile fabrics and 21 grains of other articles in the second, by the Babo Fresenius process, shall not produce a black, brown, or even a partially opaque mirror.

In 1881, Messrs. Stoddart of Glenpatrick, and in 1882, Messrs. Crossley of Halifax complained, through Her Majesty's Foreign Office, of the serious interference with their business caused by the condemnatory, and often conflicting, certificates given by various Swedish chemists in respect of carpets which they knew to be practically free from all but the merest traces of arsenic. They asserted that they took every precaution, even to the employment, by Messrs. Crossley, of a resident chemist to examine all colours and wools, and they could not but doubt either the skill of the

Swedish chemists, or the accuracy of the methods they employed. They urged, for their own protection and that of manufacturers everywhere, that the Swedish Government should appoint official analysts, and prescribe an uniform method of analysis, a form of certificate, &c. The matter being referred by the Swedish Government to the Medical Board, the latter expressed the opinion that no legislation would meet the evils justly complained of, so long as the present arsenical madness or fashion lasted, since persons could not be restrained from applying to private chemists, even after an official certificate had been given. They could not advise the Government to take the responsibility of appointing so many official analysts as would be required, nor of interfering with the freedom of scientific experts to employ that method which each found to work best; but they did recommend a form of certificate which His Majesty, by a decree of February 1883, made compulsory, in which the chemist, who must describe his qualifications, states that, having examined the superficies or weight of the article prescribed by the decrees of 1879-83, by reduction of the arsenic-sulphide with potassium-cyanide and carbonate of soda, he finds that it contains, or does not contain, the quantity of arsenic prohibited by the law of 1876.

Denmark and Holland stand next, among those countries from which replies have been received, in the stringency of their legislation on the use of poisons in the arts, and are following farther the example of the German Empire. The laws at present in force in Denmark regulate the sale of poisons, prohibit their use in confectionery, wafers, and toys, and specify such colours as may be used for these purposes. But a Bill is under consideration by the Danish Parliament, and will probably become law during the present session, based on that of Germany, prohibiting: 1. The use of arsenic in wall-papers, carpets, window-blinds, artificial flowers, and fabrics of all kinds; in candles, lamp-shades, sealing-wax; also in every description of paint, distemper, or colouring for walls or decorative purposes: 2. The use of lead in toilet articles; of lead in enamelling or tinning of cooking utensils, for which pure tin only shall be employed; of lead or of oxide of zinc in india-rubber for infants, teats, toys, mackintosh sheeting, &c. 3. The use of arsenic, antimony, lead, chromium, cadmium, copper, cobalt, mercury (cinnabar excepted), nickel, or zinc, and of gamboge in toys. 4. Colour-boxes containing any of the above are to be labelled "poisonous colours." 5. For colouring confectionery, foods, and drinks, only harmless colours may be em-

ployed, and no metal foil for wrapping the same may contain more than 5 per cent. of lead. A schedule of harmless colours is appended to the Bill.

In Holland, there does not exist any special legislation on the subject; but the new penal code now before the Rigsdag, and which will no doubt receive the sanction of the House, makes it a crime to sell any article of merchandise of a poisonous character without giving the purchaser full information as to its nature and character. If any such article be sold without this notification, the vendor is liable to a fine not exceeding 300 florins, or to imprisonment for a term not exceeding six months, if he did not know the nature of the article, or to a term of imprisonment not exceeding fifteen years if he did. Should death follow as a consequence of such sale, the seller is liable to imprisonment for a term not exceeding one year if he were ignorant of its nature, and to imprisonment for various terms to twenty years, or even for life, according to the degree of culpability, if he knew its nature and the probability of such result.

In France, the use of poisonous colours is prohibited in articles, of food; but, as regards articles not intended for consumption, there are, they are informed, no restrictions whatever, beyond a circular issued in 1860, cautioning manufacturers of the responsibility they incur in case of accidents caused thereby to the operatives engaged, and their liability in consequence to the penal code.

In Italy, the sale of poisons is regulated by law, but there is no national legislation on their use in manufactures. Such restrictions have, however, been imposed in several provinces and municipalities of the kingdom by local laws.

From Switzerland, they learn that there are no federal laws on the subject; and that, in fourteen of the twenty-five cantons, no restrictions whatever are imposed on the sale or manufacture of poisons. They have been favoured with printed documents from eleven cantons, from which it appears that, in Appenzel, arsenic and phosphorus (*sic*) are not allowed in pigments (*farbstoffe*); while Basel has in one of its laws a single clause directing the attention of the police to the manufacture of "poisonous wares." Geneva, Berne, St. Gall, and Zürich alone have any explicit legislation on this subject. In St. Gall, so far as they have any information, arsenic is the only poisonous colour in respect of which any special enactments have been promulgated, and it is forbidden to be used in wall-papers and paints for internal decoration,

window-blinds, lamp-shades, clothing, and generally in all articles of domestic use. In Berne, arsenic, anilins containing arsenic, and metallic colours generally, are forbidden in food and toys, and arsenic in wall-papers and textile fabrics. In Geneva, all poisonous colours, inorganic or vegetable, are prohibited in articles of food or in the envelopes of the same, and arsenic in wall-papers and stuffs of all kinds.

So long since as 1827, the Republic and Canton of Valais adopted a law regulating the sale and employment of poisons whether in the crude state or prepared, and fraught with restrictions and precautions which could not be enforced in a larger or manufacturing community. By one article "the sale of arsenic is prohibited. The use made of it for the destruction of rats may easily be replaced by other substances and preparations."

The most complete regulations are met with in Zürich, where, for the colouring, painting, and ornamentation of articles of food and drink, clothing, the paper envelopes of all kinds of food, confectionery, and tobacco; for toys, perambulators, and their appurtenances, wall-papers, window-blinds, garden awnings, wafers, and culinary utensils; the employment of colours containing any compounds of lead, arsenic, copper, chromium, zinc, antimony, bismuth, or mercury, is prohibited. Poisonous organic colours, as gamboge, "cardol," aconite, picric acid, picramic acid, and anilin colours, especially fuchsin, are forbidden in the case of all articles of food or drink, as are all phenol colours, viz., corallin, corallin yellow, azulin, &c. Imported articles containing any of the prohibited colours are not allowed to be sold. The exclusion of zinc and bismuth from paints seems totally uncalled for.

In Austria, we learn that, besides laws regulating the sale of poisons, as such, an Act was passed by the Reichsrath, in 1866, extending to all the provinces of the Austro-Hungarian empire, except the kingdom of Hungary and its dependencies of Transylvania and Croatia, which prohibited the use of colours (1) containing metals (except iron), gamboge, picric acid, or anilin, in all articles of food or drink, and in the ornamentation of the former; (2) also of preparations containing arsenic, antimony, lead, cadmium, copper, cobalt, nickel, quicksilver (except pure cinnabar), zinc, or gamboge in toys; other metallic colours being allowed on condition of their being fixed or covered by some varnish, not affected by moisture, or easily rubbed off. (3) None of the colours mentioned in Section 2 may be employed in earthenware vessels used for holding any kind of food, unless firmly burnt in.

(4) Arsenical colours, on artificial flowers and on wall-papers, must be well protected by varnish. (5) They are forbidden in the painting of walls of dwelling-rooms or places of assembly. (6) And, generally, such substances are prohibited in all articles of food and drink, in cooking utensils, and in toilet articles, in any form in which they may prove injurious to health.

This law has been in force in the above-mentioned provinces since 1866, but within the last two years (1882 and 1883) two comprehensive Acts have been passed extending to the whole empire, and regulating the conduct of a large number of trades and manufactures. Though rather of the nature of Factory Acts, they contain a number of provisions bearing on the subject of poisonous colours. The manufacture of all articles or matters of a poisonous nature is, by Section 15 of the law of March 13th, 1883, declared to be a trade requiring, for its establishment or carrying on, a licence from the police, and various precautions are enjoined for the protection of the health of the operatives employed. The sale of poisons is regulated by the law of 1876, a Sale of Drugs and Poisons Act.

The law of 1866, the substance of which we have given above, is the only one at present controlling the employment of poisonous pigments; but we have official information that it is the intention of the legislature to render the prohibition of the use of arsenical colours absolute in the case of artificial flowers, wall-papers, coloured papers of all kinds, and all materials of clothing; and to forbid the importation of such from abroad.

By Section 16 of the Tariff Act of 1882, the importation of all those articles in which arsenic and other poisonous colours are conditionally permitted by the above-mentioned law of 1866, is subject to certain restrictions, and such articles may be claimed only at the principal custom-houses, and by special permission from the authorities.

The Government does not think it necessary to impose any legal restrictions on what may be called the casual use of arsenic in lamp-shades, fancy stationery, sealing-wax, tapers, &c., or in toilet articles of ephemeral popularity, but contents itself (*vide* decrees of Ministry of Interior, December 25th, 1871), with cautioning persons, through the public press and otherwise, as to the danger they incur thereby.

In view of the increasing employment of anilin colours in the confectionery trade, a Ministerial decree was issued Nov. 27th, 1876, bearing reference to Section 1 of the law of 1866, adding

the whole of this class of colours to those the use of which is thereby absolutely prohibited in all articles of food and drink. A further decree of June 2nd, 1877, requires that these articles shall be packed in plain white paper, coloured papers being permitted only as a second or outer covering, and not then unless the article be perfectly dry, and thus free from any risk of contamination.

The provisions of the law of 1866 are incorporated into the Penal Code; and a decree of the Ministry of the Interior of April 29th, 1859, makes all sanitary and police laws and enactments prospective in character, so that any new article, stuff, or substance introduced into trade is at once brought under the existing law, though not specially named therein.

Lastly, with a view to ensure uniformity in the mode of procedure in the examination of suspected articles, fabrics, or substances, instructions were issued by the Minister of the Interior on December 6th, 1871, indicating the best methods to be employed in each case.

In Russia the Imperial Medical Council has issued a comprehensive list of all pigments used in the arts and manufactures in two categories of poisonous and harmless, the former being prohibited under all circumstances in which they may prove injurious to health, and a special test is prescribed for the detection of a dangerous amount of arsenic.

In Servia, Roumania and Greece the laws take cognizance of the sale and use of poisons in general, with special reference to their employment in foods and cosmetics; but in the first-named country the regulations for the inspection of factories, &c., where they may be used are extremely stringent.

We have not noticed the laws in force in the minor German States, since they are now superseded by the Imperial laws given above.

In Spain, Portugal and the United States of America no restrictions whatever exist.

The entire correspondence, of which this chapter is an abstract, has been printed as a Parliamentary paper, copies of which may be obtained of Messrs. Eyre and Spottiswoode, the Queen's printers.

THRIFT IN ITS RELATION TO HEALTH;

OR,

THE RIGHT USE OF REFUSE.

BY

GEORGE VIVIAN POORE, M.D., F.R.C.P.

JULY 22, 1884.

A LECTURE ON THRIFT IN ITS RELATION TO HEALTH; OR, THE RIGHT USE OF REFUSE.

By GEORGE VIVIAN POORE, M.D, F.R.C.P.

PROFESSOR JOHN TYNDALL, F.R.S., in the Chair.

Dr. Poore: Professor Tyndall, ladies and gentlemen, although it may be rather an inversion of the order of proceeding, I cannot begin without especially thanking Professor Tyndall for his great kindness in taking the chair to-day. Professor Tyndall has told me, that by so doing he delays his departure for Switzerland by a couple of days, and I am quite sure that that will increase our gratitude to him.

I have taken for the subject of the lecture a question which I have dealt with in a handbook written for the Exhibition,* and to-day I propose to bring before you certain facts dealt with in that handbook, rather more concisely, and rather more objectively, than they can be dealt with in it.

LECTURE.

THRIFT might be defined as the art of avoiding waste, and of putting everything to its right use. Thrift is always beneficial to the practiser of it, and to society at large. Thrift-

* "Our Duty in Regard to Health," by G. V. Poore, M.D., F.R.C.P.

lessness, or waste, is always more or less harmful to the practiser, and to society, and I need not trouble to enforce the old adage that "wilful waste makes woful want." The best school of thrift is the school of Nature. Nature wastes nothing, and wasting nothing, she is able to continue her bounties to the human race, bounties which never have failed in the history of the world, and never will fail, provided we honestly strive to find out Nature's laws and obey them to the letter.

The only right use of anything, is the thrifty use of it, and the right use of refuse must be its thrifty use. Refuse matter is looked upon, too often, as dirt and filth, something to be got rid of, thrown away, destroyed. But dirt, we have been told, is only matter in the wrong place; and so we may say that refuse in its *wrong* place is dirt and filth, which breeds pauperism, annoyance, and disease, whereas refuse in the *right* place breeds wealth, health, and pleasure. It is not my purpose in this lecture to speak of manufacturing refuse, except, perhaps, to say that with every increase of knowledge, the refuse from manufactures gets less and less. In the early days of gas-making, for instance, but little use was made of the refuse matter, but nowadays the refuse matters are all turned to account, and a ready market is found for them, as gas shareholders very well know.

In the present lecture, I shall occupy your time in considering the right use of domestic refuse, and mainly those parts of domestic refuse which go to form what we call sewage, viz. excremental matters, and the water used for cooking and washing, and which are known as household slops. The right use of this form of refuse is the chief problem which has to be solved by those who live in communities.

The early nomad races of mankind were not troubled by their refuse. When they moved camp the refuse was left upon the ground; and birds and animals, the mother earth, the freshening showers, the free air and the sunlight, soon turned all refuse matter to account; and the dirty and deserted camping ground shone in the lapse of time like a

green islet in the landscape with an abundant and vigorous herbage. Were it not for refuse matter there would be no difficulty in living in communities ; and the chief, if not the sole, duty of the sanitarian is to guide us in the right use of refuse. If every individual in the country made a right use of refuse, we should know nothing of Rivers Pollution Commissioners, Sewage Commissioners, water companies, local boards or sanitary laws ; and the amount which would be saved in useless expenditure, and the amount which we should gain in increased health and increased crops, is simply incalculable.

A poet would say that the goddess Hygeia should be represented as attended by two handmaidens, "Cleanliness" and "Thrift." The housewife who is most thrifty will have the least refuse to deal with, and she who is most cleanly will seek to quickly put her refuse to its right use

Nature moves in a circle. The earth brings forth "grass, the herb yielding seed, and the fruit-tree yielding fruit." These form the food of animals and of man, and the excreta of animals and of man become in their turn the food of plants. The organic excreta of animals are decomposed and absorbed by the roots of plants, and the carbonic acid in the breath is absorbed by the leaves, and the green leaves in their turn give out oxygen which is so necessary for the support of animal life. Thus animal and plant life are complementary and mutually dependent on each other. Neither can exist without the other.

If we bear in mind this law of Nature, against which there is no appeal, and which is as inexorable as it is beneficent, we shall have no difficulty in dealing with refuse. If we depart from Nature's law we shall meet with endless difficulty, and we shall merely impose upon ourselves the task which was imposed on Sisyphus in the lower world. Sisyphus, according to the Grecian fable, was condemned to roll a huge marble block up a high hill, and as soon as the block had reached the summit it rolled back again, and the hapless Sisyphus had to commence his task once more.

The Sisyphi of the present day are very strong. They

are corporate. They have the aid of millions of money, of cunning engineers, of steam machines. The stone is rolled often to a prodigious height, the crowd applauds the exhibition of so much strength and such marvellous ingenuity. The stone has never yet been balanced on the summit of the hill, and prodigious and unremitting labour is required to delay the rolling back of the huge block with a thundering crash into the valley, and with a disaster-bearing impulse proportioned to the height to which it has been raised.

The lower animals are of service in the thrifty use of refuse, and those who have a plot of ground attached to their houses find that a pig and some poultry will eat much of the food which man is too dainty to consume, and reduce it to a state more fitted to become the food of plants. It is found that in the downward march of organic matter towards the inorganic the lower animals are of great service, and flies, beetles, worms, water-fleas and much smaller fry are all to be looked upon as essential to the welding of the perfect circle in which Nature moves. Even the fish in our rivers will consume a certain amount of refuse and thrive upon it, but that amount is strictly limited. Poultry especially require a little animal food, and if that which man cannot eat be boiled for the use of the fowls they will lay more eggs than when their diet consists solely of corn.

The most unthrifty thing we can do is to be ill. A man who is ill becomes useless and a hindrance. If a man becomes ill from a preventable cause someone is to blame.

Now, in making use of refuse, our first duty is to take care that our refuse matter is not a cause of sickness to our own or to other's households.

At present it would be difficult to say how much sickness is due to a wrong use of refuse; and were I to ask those present who have had cognizance of disease, due to sewer air or other similar cause, to hold up their hands, I fancy that few arms would remain unlifted. Certain it is that with the extension of great sewerage schemes, the evil

effects of "sewer air," has become one of the staples of conversation in this enlightened country. Nor is this to be wondered at, for the victims of what I venture to call a "wrong use of refuse," have often been those whom the country values most.

The diseases due to a "wrong use of refuse," are those which were stigmatised by Mr. John Simon as filth diseases, filth being matter in the wrong place.

Among the diseases due to this cause are,

1. Common sore throat or quinzy, which is the most frequent of all. When we hear of people being liable to sore throat, we may be tolerably sure that sewer or cess-pool air, or filthy air of some kind is the cause.

2. Typhoid fever.

3. Cholera.

4. Diarrhœa.

5. Diphtheria.

6. Scarlet fever.

7. Acute pneumonia.

8. The dangerous febrile troubles which often arise in the lying-in room after confinements.

You will recognise the fact that the various diseases whose names are here written, mostly belong to that class which is spoken of every week by the Registrar General as "Zymotic." Why Zymotic? The word Zymotic is derived from the Greek, and means a *ferment*. Why has this name been given to a particular class of diseases? To understand this I must ask your attention to the phenomena of vinous fermentation.

For fermentation, the first thing necessary is a fluid which is capable of being fermented, or which in other words is fermentable.

The sweet-wort of the brewer, grape-juice, apple-juice, and whey, will occur to our minds at once as fermentable liquids.

To the fermentable liquid we next add the ferment. The ferment known as yeast, or barm, is, as is now well known, a plant, the so-called *Torula* or *Saccharomyces Cerevisiae*.

This plant, which belongs to the class of fungi, grows at the expense of the liquid. Quantities of carbonic acid are given off. The head of yeast continues to enlarge, and the sugary constituents of the fermentable liquid are largely converted into alcohol.

The yeast plant grows at the expense of the fermentable liquid ; the fermentable liquid is indeed the soil in which it grows, and in growing the plant robs its "soil" of oxygen, and gives off carbonic acid, while alcohol is left as one of the results of its growth. After fermentation has ended, the yeast plant settles at the bottom, and the liquor is alcoholic. No further fermentation of *the same kind* is possible in the liquid. If, however, a particle of living yeast plant, it matters not how small, is transferred to a second fermentable liquid, fermentation will take place, with the increase of the yeast plant, the giving off of carbonic acid, the formation of alcohol, and the gradual dying out of the process, when the plant has used all its available food. Fermentation once started, its continuance is practically illimitable so long as there are fermentable liquids for particles of yeast plant to grow in, and so long as there is machinery for transferring the leaven from one liquid to another.

The analogy between this process and one of the so-called zymotic diseases is at once evident. Let us compare fermentation to typhoid. Here the blood of the patient is the fermentable liquid. The typhoid poison is the ferment. The phenomena of the fever take the place of the phenomena of the fermentative process. The fever reaches a climax and subsides, and leaves the patient inapt to suffer from the same febrile process for the term of his natural life or at least for a prolonged period. In another particular the processes of fever and fermentation are strikingly alike. The dose of ferment or fever poison which sets the process going is infinitely small. It multiplies incalculably in the body, and just as the crop of yeast plant grown in one vat is enough to start the process in thousands of other vats of fermentable liquid, so the fever poison which escapes from the body of the patient is enough to

leaven thousands of other bodies with fever. So striking is the analogy between fermentation and some fevers, that we must admit that to call them zymotic, or ferment diseases, was quite warrantable. This theory of zymotic disease has remained till comparatively recently a mere hypothesis, very probable but not proved.

The question of the zymotic theory of fevers, thanks to the microscope and to improved method of investigation, (investigations in which Pasteur, Lister, Koch, and our illustrious chairman Professor Tyndall, have been among the pioneers), is rapidly emerging from the realms of fancy to the regions of fact. It is no longer a matter of faith but of demonstration. What is the nature of the proof which has been offered? Let us take the case of a disease which is equally fatal to animals and man, viz., splenic fever of cattle, anthrax, malignant pustule, charbon, or woolsorter's disease, as it has been called by various observers; now in every case of this disease the microscope reveals a peculiar organism, very minute, but plainly distinguishable, which is not found in animals not suffering from splenic fever.

This is in itself ground for a strong presumption that the organism, which is called *Bacillus Anthracis*, is in some way connected with splenic fever.

The $\frac{1}{1000000}$ part of a drop of the blood of an animal suffering from splenic fever, if inserted into the body of another animal, *apt to take the disease*, caused, inevitably, the death of that second animal by splenic fever. Even this, however, is no proof that the *Bacillus Anthracis* is the cause of the fever.

If it were possible to separate the *Bacillus* (which is a low form of fungoid growth), and cultivate it apart from the animal, then the effect of inoculating the *Bacillus pure and simple* might be tried.

This in fact has been done; the *Bacillus Anthracis* has been cultivated in tubes of suitable liquid, suitably prepared, and the details of which need not here be discussed. A particle of the first crop of bacilli has been used to grow a second crop in a second tube, and so on to a third, fourth,

fifth and even thirtieth generations. Then the remote lineal descendant of the original crop of bacilli, has been injected into an animal, with the result that the animal has died of splenic fever, and the blood has been found swarming with *Bacillus Anthracis*. We may consider that as regards splenic fever the case is proved, that the disease is in some way inseparably connected with the growth of the *Bacillus Anthracis*, and that without the *Bacillus Anthracis* there can be no splenic fever.

The proof consists of 4 steps.

1. The invariable occurrence of the bacillus in the bodies of men and animals suffering from the disease.
2. The non-occurrence of the bacillus in animals not suffering from the disease.
3. The cultivation of the bacillus in organic liquids outside the body.
4. The occurrence of the disease, and the subsequent discovery of bacilli in the blood of animals inoculated with the bacilli propagated by cultivation outside the body.

We may conclude, therefore, that splenic fever is actually a zymotic disease, and that it is due to the growth of a zyme, or ferment, in the body of its victim. It will be noted that for the clenching of the proof inoculation is necessary. When inoculation is possible, proof is comparatively easy, but when proof by inoculation is impossible, then in place of absolute certainty we only have a very high degree of probability. The proof of the dependence of the disease upon a low form of multiplying organism may be considered as *proved* in the case of *splenic fever*; some forms of *pyæmia*, or hospital blood poisoning, *erysipelas*, *tubercle* or *consumption*, and *vaccinia*.

Organisms have been met with in connection with malarious fevers, typhoid, cholera, acute pneumonia, diphtheria, glanders, and other diseases.

The absolute proof is yet wanting in the case of many diseases. It is wanting, for instance, in the case of typhoid and cholera, because no animals have been found to take

these diseases, and therefore the clenching proof of inoculation is wanting.

If, however, we have a group of infective diseases which have so much similarity that we have been in the habit of calling the whole group by the name of zymotic, and if we find that the phenomena of these diseases can only be accounted for on the hypothesis of the infecting matter being analogous to a ferment ; and if with regard to some of these diseases this theory is proved to be true ; and if with regard to others we have incomplete proof, then I think we are bound, in the absence of strong evidence to the contrary, to assume that the whole group is due to the infection of the body by multiplying organic germs.

Using the best judgment I can, I feel convinced that the cause of typhoid, cholera, pneumonia, and the other infective diseases, is to be found in germs, allied to microcci, bacteria or bacilli.

There is a great difference between an infective poison and other poisons.

Suppose I have to deal with an ordinary poison, such as arsenic or strychnine. In order to produce a fatal effect, a certain quantity must be given. A small quantity of arsenic or strychnine may be beneficial, and in point of fact they are both valuable medicines.

If, again, I dissolve my fatal quantity of arsenic or strychnine, and throw it in a river used for drinking purposes, then the chances are that it will poison nobody, for it will be soon so extremely diluted that no stomach would hold a fatal quantity of the poison. Again, the arsenic, or the strychnine, undergoes no multiplication in the body of the victim, and the quantity which leaves the victim's body cannot be more, and will almost certainly be less than the quantity taken.

With the zymotic infective poisons the case is different.

The amount inoculated seems to make no difference. The smallest conceivable quantity ($\frac{1}{1000000}$ of a drop) of a fluid containing an infective organism will kill, just as the smallest possible quantity of the yeast plant will

cause the fermentable liquid to undergo complete fermentation.

The reason for this is to be found in the fact that the poisonous germs multiply with incredible speed. They multiply by simple division, and this division goes on so rapidly that it has been computed that a single bacillus may have increased to 16,000,000 in 24 hours. If then only a single bacillus finds its way into the blood, its multiplication in that fluid is so rapid that the course of the disease is not appreciably altered by the size of the dose.

Again the infective zymotic poisons differ from other poisons in this, that they are *particulate*, each particle being potent for evil and, not being soluble, incapable of being destroyed by mere dilution. If a dose of typhoid matter be mixed with five gallons of water (as happens every day), then each drop of that water may become capable of conveying fever. If part of this mixture of typhoid matter trickles from a sewer or cesspool into a well or reservoir (and this accident is of frequent occurrence), then the whole of the water in the reservoir becomes capable of conveying poison. The epidemic of typhoid brought about by the poisoning of the water in the Caterham Valley will occur to the minds of many of you as an instance in which it was proved, that one man with typhoid infected at least 350 persons, who drank the Caterham water. Here the dilution was practically infinite, but the poison being particulate, this made no difference in the result. If water poisoned in this way be used for washing milk cans, then each drop of the milk may become infective, as is proved by the fact that so-called milk epidemics of typhoid are among the common accidents of our time, accidents far more fatal as a rule than any railway accident which ever occurred. Typhoid and other zymotic infective poisons being, as I have said, particulate, it seems to me, and it will, I think, seem to you, that the mixing of these poisons with water and allowing this water to trickle to our water sources is the most perfect method of producing a wide dissemina-

tion of typhoid or cholera poison which possibly could be devised.

Not only are these poisons particulate, but they are alive, and each particle is capable of practically unlimited multiplication.

Their cultivation and multiplication may be effected, as I have said, outside the body. This is done every day, and may be seen by those who will take the trouble to pay a visit to the Biological laboratory attached to this Exhibition. For experimental purposes they have to be grown in clear transparent fluids, very carefully prepared from meat broth, gelatin, and a peculiar form of albumen. Many different organic fluids have been used for their cultivation, and it is probable that any putrescible liquid will serve for this purpose.

It is almost certain that milk serves for the cultivation of typhoid and scarlet fever, and our knowledge of these organic poisons makes it in the highest degree probable that milk (which is a fluid most sensitive to impurities of all kinds), serves, especially in hot weather, as a soil in which the poisonous germs of these diseases multiply and flourish. It is difficult to account for the frequency of milk epidemics, unless we assume that milk is a cultivating liquid.

If milk serves as a cultivating liquid, how about sewage? Does sewage, consisting of excremental matters, water and household slops, fulfil the conditions necessary for the cultivation of disease germs? It is certainly putrescible, for every sewage grating gives off the odours of putrefaction, and a peep into a cesspool will disclose a bubbling, stinking, frothing liquid, undergoing putrefaction, which is only a variety of fermentation and depends on conditions analogous to those which determine vinous fermentation, or acetous fermentation, or lactic fermentation. Cultivating liquids, as used in the laboratory, contain meat broth. What is cooking water but weak meat broth? Cultivating liquids contain gelatin, so does sewage. They contain albumen; so does sewage. Urine has served as a

cultivating liquid in the laboratory ; there is urine in sewage. In fact, we can hardly escape from the conclusion that sewage may, and possibly *does*, serve as a cultivating medium for the germs of zymotic disease. That typhoid and cholera are most frequently brought about by water-carried sewage trickling into our water sources, there is no doubt.

Not only does sewage water cause typhoid, but sewage air also ; and this is a possible reason for assuming that typhoid poison undergoes development in the sewer. I have said that bacilli multiply by simple division, bacillus producing bacillus. This, however, is not their only mode of multiplication. They may multiply by spores, round bodies, which are developed in the bacilli, and are analogous to the seeds of a plant. Just as plants may be propagated by cuttings or by seeds, so may bacilli and fungi generally. Cuttings of plants very easily die, and if a cutting is to strike, it must not be allowed to dry up, but it must be planted with as little delay as possible. Seeds, on the other hand, may be, and are habitually dried, and they are far more tenacious of life than cuttings.

Bacilli, apparently, die very soon if dried, and they are easily killed in a variety of ways ; but spores withstand dryness and heat far better than bacilli, and, like seeds, they grow again when the conditions necessary for growth are presented to them. By the time that a bacillus would be dry enough to be dislodged from above the high water mark of a sewer or cesspool, and to be blown into a dwelling-house, it would probably be harmless ; but if the bacilli should develop spores, and these light bodies (much smaller than bacilli) should, when dried, be carried by the sewer air into a house, they would probably cause typhoid fever in those who are unfortunate enough to inhale the air. Spores would be more likely to be air-borne than the bacilli, being lighter, and this theory receives some support from the fact that when typhoid fever is caused by sewer air, instead of sewer water, the incubative period is longer, and this may be due to a difference in the conditions of the initial poison.

In this country it is almost certain that cholera poison is not conveyed through the air. Many Indian physicians hold a different opinion, and contend that cholera is certainly carried through the air in India and falls with deadly effect on large communities. It may be that in the one case the disease is conveyed by bacilli only, which must be moist to be active, and which die (like cuttings of plants) as soon as dried, whereas the epidemics of tropical countries may be due to air-borne spores bred by intense heat, and which, like the spores of the potato disease, affect whole communities at "one fell swoop."

Let us look at some of the conditions of life which are necessary for the development of bacilli. The first of these is a *certain degree of moisture*, and most observers agree in stating that dryness is unfavourable to them, and kills them, although it does not so readily kill the spores.

I need hardly say that water carried sewage is moist.

The next condition is a warm temperature, varying from about 60° F. to 104° F. A temperature much above 104 kills bacilli, and a low temperature from 50° F. downwards stops their growth, but does not kill them.

Now in sewers and cesspools there is neither heat nor cold, summer nor winter, and the temperatures are such that it is possible for bacilli to flourish all the year round.

Bacilli want a certain amount of air for their growth. This they would find in sewers and cesspools. They flourish in decomposing organic matters, this is always present in sewers and cesspools, and in many sewage-sodden soils.

Again, being related to fungi, they flourish in the dark, and it is believed by some that light prevents their development.

If we want bacilli to flourish, we must provide them with a suitable liquid to flourish in, the impossibility of being dried up, perpetual warmth and darkness. All this is found in sewers and cesspools. And it is impossible to contemplate those recent additions to our knowledge, which I have been at some pains to briefly explain, without feeling strongly that as a nation we are for the most part

dealing with our refuse in the most unscientific way possible, the most extravagant way, the least thrifty way. I have no doubt whatever that the various dry methods of treating excremental matters are the healthiest and the thriftiest; and it may be laid down as an axiom that all putrescible matters should be buried or dried. If buried, or mixed with earth, they cause no offence. There is only one use for putrescible refuse, and that is to feed plants with it. Nature moves in a circle. Animals feed on plants and on each other. Plants feed on the refuse of animals. Can thrift go further? There should be no delay in applying organic refuse to the soil, or in planting the soil. If putrescible refuse is mixed with water, and allowed to seethe and stink, it is a danger to us, and its increase of bulk and its dilutions renders it unmanageable. It cannot be too widely known that stink means waste. It means that ammoniacal compounds which plants are in need of are being wasted.

As for slop water, it should be applied to the soil every day. Let it be freely exposed to the air and the sunlight, to the frost of winter, the heat of summer, the drying influence of cutting east winds and drought. Don't keep it in underground pipes and tanks; and don't apply it day after day to the same spot, lest the spot gets sodden and putrid, and becomes a favourable ground for putrefactive organisms to grow in, and the water produce fissures in the earth, and travel to the well, bearing disease germs with it.

Someone may be inclined to think that I am very foolish to say all this to a London audience, for in London water-carried sewage is inevitable. This may be, but still no one can regard the condition of London with equanimity. Nameless abominations, we are told, carried by the London sewers to Barking, flow up with the tide to Teddington, and ebb back to Greenhithe. Water carried sewage flows into the upper Thames not far above the intake of the water companies. The water is low, the weather is hot, the cholera is at our gates, and if we escape this epidemic, do we deserve to escape it? And if we escape this one,

how long shall we go unscathed, and shall we escape the next?

Now let us look at water-carried sewage from some other points of view.

Let us admit that it prevents the accumulation of putrid refuse about our houses, and let us admit that sewers are in some respects better than cesspools, although cesspools as a rule only work evil to one house, whereas with a system of sewers it becomes difficult to get away from your neighbour's diseases.

Sewers and cesspools are equally liable to leak and allow their contents to trickle into our drinking water, so that from this point of view they are both equally undesirable. There are many sewers, that of malice prepense, as lawyers would say, empty the whole of their content into our drinking water.

Sewers are an enormous expense. Those of London cost about £6,000,000, considerably more than double their estimated cost. A complete system of water-carried sewage encourages overcrowding, because a sewer does away with the necessity of any curtilage to a house. The density of population in some parts of London steadily increases. What once were gardens or back yards are now dwelling houses. Houses steadily increase in height, and there being no need of any arrangement for filth disposal except by the sewer, the houses are built in serried ranks, and often back to back. We make no serious effort to control building schemes, but when with the lapse of time the dwellings of the rich become the dwellings of the poor, we simply wonder what is to be done, and make no effort to prevent what we are almost powerless to remedy. From a sanitary point of view, overcrowding is most undesirable. It breeds squalor, discontent, disease. The effects of overcrowding in London are shown in the high mortality from such diseases as whooping cough and measles. They are seen in the murky sky, the general dirtiness, the comparative difficulties of vegetation, the anxious, pale population, and the low vitality generally observable. For London is

a city in which complete recovery from the effects of acute disease is almost impossible.

Let us look at the effects of water-carried sewage on our dwelling houses.

A very excellent work entitled "Our Homes and how to make them healthy," has lately been published by Messrs. Cassell and Co., a firm which has done great service to the nation in disseminating popular knowledge. This book is edited by Mr. Shirley Murphy, the medical officer of St. Pancras, and the writers of the several articles are each of them leading men in their professions.

Mr. Thomas Eccleston Gibb, who writes on the legal liabilities of householders, warns us that "there is no part of a house where builders are so likely to 'scamp' their work as the drainage, and they are probably in that point under the least amount of supervision by public authorities. A local surveyor may order the work to be done in a particular manner; but the work is done and covered up in his absence, and the nicely-worded bye-laws which hang in the builder's office are not more likely to be looked at by the builder, than are the drains, when buried beneath the ground, by the officer appointed to see those bye-laws carried out. Nothing short of an alteration in the system can remedy this great sanitary defect."

Mr. Eassie, C.E., in a very able article, tells us of some of the difficulties and dangers of house drainage, and warns us:—

1. That the pipes sent by the maker are often so bad that the unloading of them at the railway station must be superintended by someone who represents the interests of the purchaser, and that the individual pipes must be inspected, and the bad ones rejected and returned to the manufacturer at his expense.

2. The chief defects of pipes are, that they are badly fired, too brittle, too rough on the inside, too thin and ill-fitting at the sockets.

3. The laying of pipes is no easy matter. The ground may get sodden and sink away beneath, and thus the levels

may get wrong and stoppages occur. Again, workmen will often maintain a level by means of wooden wedges, and these in time, rot, and the proper level is lost.

4. The joining of pipes involves great care, the sockets must fit and the cement be good; and we are warned that if the cement projects into the interior of the pipe the flow through the pipe is impeded and dangerous stoppages may occur. Again, it is common to make a junction between a big pipe and a small one without a proper diminishing pipe, and then leakage is sure to occur, and the earth gets sodden.

5. If pipes be laid (as often is the case) before the heavy building work is finished, they run a great risk of being broken by the falling of heavy bodies on the earth above them.

6. Pipes are so liable to become disarranged in some way that it is never safe to have them beneath a house. When they pass through the wall of a house they are very liable to break when the house settles; stoppage will occur and the drainage will be penned back, and become a source of danger.

[N.B. Houses are very liable to settle when they are built, as often is the case, on heaps of rubbish and rotting refuse.]

7. Pipes are very liable to get choked, the chief causes being, (*a*) defects of manufacture or workmanship as indicated above; (*b*) collections of sediment where the level becomes deranged; (*c*) collections in syphon bends, which, we are informed, are "the best abused article in a line of drainage;" (*d*) the congealing of fat from the kitchen; (*e*) the invasion of pipes by the roots of trees—for trees have a nasty trick of driving their roots where they can get nourishment.

8. "Grease traps" are necessary, especially when the scullery sink is at the farthest point from the sewer as it is in the majority of London houses. These grease traps must be cleaned every two or three months, because they generate, during decomposition, "very disagreeable smells."

9. Having laid our drains, our next efforts are directed to keeping back the foul air which must accumulate in a foul place; "traps" are necessary. Their name is legion, and we are warned that the commonest of all (the bell-trap) is "most reprehensible."

10. Having finished with drains, we next turn our attention to the "soil-pipes." These are too often made of badly-socketed earthenware pipes, and when tested they are not unfrequently found to leak at every joint, and to be broken at the foot.

11. As to the proper material for soil-pipes, we are told, (a) that zinc is too weak and must not be used; (b) that cast-iron is not a bad material, but "the vilest attempts at making a joint are perpetrated;" (c) lead is recommended as the best material, but then the lead must be thick enough, and the jointing perfect.

12. The joints of soil-pipes must not be "slip-joints, where one end of a pipe is slipped into the end of another and the space filled up with *no matter what!*"

13. The soil-pipes must be properly fastened to the walls. We are told how, out of ten stacks of soil-pipes examined in a northern hospital, there was scarcely a sound joint found from want of this precaution.

14. Then the soil pipe (if it can be made air-tight) needs artificial ventilation, and the ventilator of the same diameter as the soil pipe must be carried to a height of at least four feet above the highest window, and we must take care lest the birds come and build in it.

15. "It is constantly a matter of surprise and disgust to notice, especially in houses built for the working and middle classes, how often rain-water pipes are made to do duty for soil-pipes as well; how often the waste-pipes of baths and sinks are taken into such combined pipes; how always these pipes communicate at the foot with the house-drain, not disconnected from the sewer in any way; and how, very frequently, such pipes, doing double duty, terminate level with the top windows, giving off vaporous effluvia into the warmer room whenever the

top sash is pushed down or the bottom one lifted" (p. 638).

16. It is necessary to disconnect the soil-pipe and the house-drain generally from the sewer, in order that the air of the sewer may be kept from the house, and a current of air circulate in the house pipes. The means of disconnection are complicated, and the ground plans of some of these disconnecting schemes remind me in appearance of some of Euclid's propositions. They require an expert for the proper understanding of them, and we are warned that, "Far too frequently after an ordinary builder has produced what he terms disconnection and ventilation on modern lines, the bulk of the work has to be re-arranged at considerable expense."

17. Pipes and drains are so frequently stopped that it is advisable for the owner of a large house to keep on the premises proper cleansing rods and forcing gear.

Mr. Eassie having given a number of warnings as to what *may* occur in consequence of ignorance, bad workmanship, or accident, Dr. Corfield takes up the running, and from the store of his ample experience tells us what *has* occurred. Dr. Corfield tells us:

18. How rats make runs from the drains beneath our houses and invade the house, and how they will run from a defective drain in one house, beneath a parti-wall, and up the drain of the next house.

19. How he has found cesspools leaking into wells.

20. How drains have been found with an insufficient fall, or even sloping the wrong way.

21. How drains have been found not jointed at all, or jointed the wrong way, so that they must leak.

22. How it has been attempted to take a drain round a corner by means of two straight pipes, meeting at an angle instead of a proper curved pipe, and how the open angle necessarily leaked.

23. How junctions are made by means of clumsy holes roughly knocked in a big pipe, in order to take the end of a small one, and how blocks and leakage are thereby brought about.

24. How the sewer air comes up the kitchen sink.
25. How rain-water pipes and even special ventilating pipes bring sewer air to the attic windows.
26. How the *upper end* of a soil pipe has been allowed to remain open and terminate *inside the house*.
27. How the *lower end* has been found to have no connection whatever with the drain.
28. How soil pipes have been found traversing the wall of a larder, and how they have been perforated by the hooks and nails on which the mutton is hung.
29. How traps are often a delusion and a snare, and how in addition to the Bell-trap, the next commonest, the D trap, is worse than useless.
30. How lead quickly wears out and gets perforated.
31. How sewer air may come up the waste pipe, or overflow pipe of the cistern, and contaminate the drinking water.
32. How "syphon bends" get emptied by suction or choked by deposit.
33. How pan closets and D traps get plugged and "the container" foul.
34. How valve-closets, solid plug-closets, wash-out closets, and Hopper-closets are each liable to their special and peculiar defects.
35. How special cisterns are necessary for the service of the W.C., and how epidemics of typhoid have arisen from neglect of this precaution.
36. Finally, we are told how "foul air often travels about houses by most unexpected channels. Rat-runs have already been mentioned; but besides these it travels under floors, behind panelling and wainscoting, along ventilating shafts, through defective flues, and even through the tubes in which bell wires are carried, through which foul smells from the basement, and still more frequently, the products of the combustion of gas-burners, often ascend into rooms upstairs."

The above catalogue of common dangers in modern houses seems to show that as all "modern sanitary improvements" are liable to wear and tear, the danger arising

from them (even assuming that they are all, to begin with, perfectly made and perfectly fitted) must be proportionate to the quantity used.

They all cost money, many of them are very expensive, and they all add to house-rent, or diminish the profits of the landlord.

When there is a small garden they are *all of them* unnecessary, and it is perfectly idle to contend that there is greater decency in the use of water apparatus than in the so-called dry methods. Dry methods do not open the door for the profit of patentees and others ; but if a little of the ingenuity which has been devoted to the manufacture and subsequent exclusions of sewer air had been devoted to the easy use of dry methods of filth manipulation, many lives would have been saved and much money also.

It is the fashion of the present day to bring all that is nasty into our houses, even though those houses stand in hundred of acres of park land. And Sir Gorgius Midas, who never spends a shilling on his library, will spend hundreds or thousands in order that he and his household may be in constant danger of sewer gas.

If Jonathan Swift had lived on into the nineteenth century, assuredly Lemuel Gulliver would have been made to take a voyage to the modern Hygienic Laputa ; and possibly Swift's wit and satire would have been able to bring people back to the straight road from which they have gone so dangerously astray.

Great cities which have got fast stuck in a sanitary quagmire must perforce pay large sums to have their troubles lessened ; and to that end it is to be hoped that the almost endless clauses of Sanitary Acts will be of use. The moral duty of the individual in a city is to obey the law, and assist in every way in its proper execution.

In rural and semi-rural districts, the individual ought no more to ask others to keep him clean than he asks others to feed him, or clothe him. He ought to take a pride in keeping his house wholesome and clean, and he ought to receive every encouragement from the authorities if he do so.

All houses should be inspected *at regular intervals* by officers who are independent of local considerations, and we ought to prevent nuisance and not wait till it becomes so glaring that neighbours are bound to take the unpleasant course of complaining. Under the present system we merely shut the stable door after the horse has been stolen, *i.e.*, we only abate a nuisance after it has done its mischief.

If filth has to be removed from premises by the public authorities, then such removal should be paid for—by the owner in the case of weekly tenants, or by the occupier in the case of yearly tenants and leaseholders, or freeholders.

All water-closets should be taxed, because they necessarily leave filth to be dealt with by the public authorities. If charges were equitably levied, then one of two things would happen: either (*a*), the work of the public authority would dwindle to a minimum; or (*b*), those who trust to the public authority to keep them clean would pay more than those who keep themselves clean.

The opposite course is too often taken. Compulsory connection with sewers is often insisted upon even in rural places where there is no necessity for such compulsion, and good citizens are often inordinately taxed to cleanse the filthy property of bad citizens.

An equitable adjustment of Sanitary Rates seems to be the first essential for encouraging the individual householder to do his duty. This is more essential now than formerly, because by the Rivers Pollution Act all filth must be cleansed in some way before it is allowed to take its course along the lines of natural drainage to a river.

There is another aspect of water-carried sewage which demands attention.

No one doubts the power of engineers to lay pipes or construct sewers, and to convey sewage to any point that may seem desirable. When we were taught that the best thing to do with filth was to wash it out of our house into the nearest stream, our engineering difficulties were small, and then the bigger the sewage scheme the better for the ratepayers and the worse for the river.

Having deliberately converted our rivers into sewers, we next pass the Rivers Pollution Act, by which it is provided that sewage shall not flow into rivers, and that all water which is dirtied shall be cleansed again before taking its natural course to the river. Having collected an enormous quantity of filthy sewage in one spot the difficult question is what to do with it.

If the sewage is collected at the sea-shore it may be thrown into the sea.

If this is impossible then there are two courses open :

- a.* Sewage farming.
- b.* Chemical treatment.

From a pecuniary point of view they are both disastrous, but from a health point of view sewage farming, if well done, is probably the best, although in time of cholera I should not wish to have my salads grown on such farms. With regard to the chemical treatment of sewage, it serves to remove mainly the suspended matters. Nobody pretends that it makes sewage water wholesome ; and if we are to have precipitation works at Mortlake, only a madman would think of drinking or bathing near this outfall, for even the promoters of such a scheme do not pretend that their coarse methods are capable of removing the germs of zymotic disease.

Again, chemical precipitation schemes are not only useless to prevent the dissemination of disease, but they are most extravagant. The delaying of the sewage in tanks is in itself dangerous ; the tanks and machinery are very expensive ; the daily treatment of the sewage with chemicals is so costly that the treatment is apt to become in time nominal rather than real, and the resulting sludge has but a slight manurial value, because the fertilizing matter is for the most part contained in the water which escapes.

Again, when sewers have once been constructed, the quantity of sewage which flows through them tends constantly to increase, because the jerry builders are sure not to lose the chance of making money by putting their miser-

able houses as close as possible along the line of the sewer. Thus the outfall works in time become too small, the sewage steadily increases, and in the end the river water is more poisonous than it was at the commencement, and the sewerage scheme ends by bringing about the very thing it was designed to prevent.

The argument has been used that since, in any case, sewers must be provided for slop water, therefore it is best to have all excremental matter water carried, and have done with it. This clearly is an error, because the difficulties of water carried sewage only begin at the outfall of the sewers when the question, "What are we to do with it?" arises.

Each gallon of sewage which has to be dealt with, whether chemically or by irrigation, brings its quota of expense, and every municipality should strive to have as small a sewage scheme as possible and to keep the sewage as thin as possible. Every householder should be encouraged in every way to send as little refuse matter as possible into the common sewers.

The lessons to be learnt from the preceding long discussion seem to be these :

1. Keep solid and liquid refuse always separate.
2. Apply both to the land before putrefaction sets in.
3. A cesspool is always dangerous to yourself and neighbours.
4. A pit for the reception of *solids only* is far less dangerous than a cesspool.
5. It is better to let slop-water run in an open channel than a closed pipe, because the former is more easily cleaned, and the slops are exposed to the air, drying winds, heat and frost.

The immediate filtration of house-slops, so as to free slop-water from the coarser impurities, is easy, and may be effected (provided the discharge pipes are 18 inches from the ground) through a flower-pot half full of cinders, or any other simple contrivance, and the filter may be changed as often as is necessary.

It is wasteful to throw away slop-water if you have a garden or conservatory in which it may be used.

If you have a big garden, then collect your slops in a tank on wheels and apply them to a different piece of ground every day.

Or you may have a special slop-filter made and provided with good drainage beneath, and filled up with porous earth, to be changed at intervals. A filter of this kind, as big as an ordinary two-light pit or hot-bed, would filter fifty gallons of slops per diem with ease.

A living filter is the best of all: and the surest way of making slops innocuous is to apply them to well-drained land in cultivation, and it must be borne in mind that slop-water alone is much better than mixed sewage for irrigation purposes. The cleaner the fluid the better, because the earth does not get clogged. Immense crops of rye grass, roots and succulent vegetables may be obtained in this way.

When sewage irrigation is conducted on a large scale by municipal authorities one acre of land is allowed to every hundred inhabitants, and it is estimated that each acre will take two thousand gallons of sewage every twenty-four hours. Thus it is calculated that there is twenty gallons of sewage per inhabitant to be dealt with, inclusive of water used for street cleaning and municipal purposes. Domestic slops (where water-closets are not used) average not more than ten gallons per head; so that a very small piece of land would be sufficient to take the slops of a household, which used the earth or other dry methods of treating solid excrement. If an acre will take two thousand gallons of mixed sewage, it would probably take three thousand gallons of slops only. An acre consists of rather more than 43,000 square feet, so that 430 square feet would be wanted for 30 gallons, and (say) 150 square feet for 10 gallons, and 1500 square feet for a household of ten persons, or a piece of ground 50 feet by 30; so that the possessor of a quarter of an acre of garden need (theoretically) only use one-seventh part of it in order to render the slops

of ten persons fit to be returned to the natural water-courses.

I have gone into this calculation in order to show what are the bare possibilities of dealing with sewage. A slop-garden, a slop-plot, a slop-conservatory, a slop-hotbed, or even a slop-flower-pot are each of them more manageable than a sewage farm.

I cannot conceive how any householder who is the possessor of ever so small a plot of ground can calmly contemplate cesspools or sewers, when the dry-earth system is so much more cleanly, cheap, and healthy.

It is perfectly evident from what I have said that the owner of a very small garden may be quite independent of sewers and cesspools, and he will have the satisfaction of knowing that no filth, from his house at least, is trickling to a water source or poisoning the air, and he will have the satisfaction of having his health in his own keeping instead of handing it over to tradesmen whose work is out of sight. He will have the satisfaction of feeling also that he has done his duty to himself, his neighbours, and the soil.

It may, I think, in relation to this question of sewage, be laid down as an axiom that—*the greater the detail the greater the ease, the greater the security to health, and the greater the profit.*

This was fully appreciated by Moses (the greatest sanitarian that ever lived), as those who can call to mind the 12th and 13th verses of the 23rd chapter of the book of Deuteronomy will remember.

The great leader and lawgiver of the Jews made it incumbent on the individual to take care that his refuse matter should not become a source of danger or annoyance to his neighbour or the community, and I am strongly impressed with the fact that in the present day the individual is forgetful of his duty, and that he is too often encouraged to forget it by public authorities.

The valley of the Thames is now in great difficulty about its sewage. The valley of the Thames is to a great extent a region of villas and market-gardens, and there are

thousands of houses that ought not to be dependent upon any public authority to remove their filth. The individual is unwilling to do his duty, and the authorities are unwilling to compel him. Instead of making the villa-resident deal with his own filth as he might do, instead of compelling the jerry-builder to bear the expense of cleansing his unwholesome houses, as he ought to be made to do, it is sought to remedy the evil by a great sewage scheme, and good citizens will be heavily taxed to cleanse the filthy property of bad citizens, and the end will be that, although there may be less obvious matter in the Thames, it will, as a matter of fact, be more poisonous for drinking purposes than before. And when the sewer has been made the jerry-builder will rejoice. Market-gardens will grow cottages instead of cauliflowers, and little houses will be packed side by side, and perhaps back to back, and lovely spots where the Londoner has sought health and relaxation will become as crowded as Marylebone. There is no doubt that one of the evils consequent on sewerage schemes is overcrowding. As long as it is considered that the connection of a house with a sewer is the be-all and end-all of sanitation, and that sufficient curtilage is of no consequence, it may be safely assumed that the speculative builder will not fail to seize his opportunity. These great schemes involve an enormous initial outlay and a huge annual expense, and they press very unfairly on the inhabitants. For the owner of a villa who may have a laudable desire to use and purify his own refuse matter is more heavily taxed than he who is absolutely dependent on the public authorities for the removal of filth from his residence. Those who cultivate a sense of moral duty ought to be encouraged, and those who have no sanitary morals should be discouraged, but in practice the course which is taken is too often exactly the reverse.

Railways have already done much for the destruction of the market-gardens of the Thames valley, and a great sewage scheme will do the rest. Hitherto the manure from the stables of the London mews has been utilized to a

great extent in these gardens, with the result that the former have been marvellously clean and healthy, and the latter marvellously productive. With the disappearance of the Thames valley gardens those who keep horses will have to face inconveniences and expenses to which hitherto they have been strangers, and the cleansing of the London mews will become more difficult.

I have said with regard to sewage disposal that "the greater the detail, the greater the ease." This is obvious. A man with a small garden should have no difficulty in dealing with his refuse, and it is his moral duty to do so. Again, even where there is no garden the solid excreta should not be put down the sewer. Arrangements ought to be made for its decent removal in a dry state, and no house ought to be built unless some such arrangement is provided for. The only methods of sewage disposal which have returned any profit to municipalities are the so-called dry methods. Glasgow, Manchester, Warrington, Carlsruhe, Mannheim, and other places of less importance, testify to this fact; and if it can be done in great cities where the refuse has to be taken long distances before it is utilized, how much more readily can it be done in country and suburban places where it can be utilized almost on the spot?

Directly solid refuse is diluted with water its money value vanishes, although its theoretical manurial value remains, which is not the same thing. A ton of quartz may contain gold of the value of a sovereign, but it is obvious that the ton of quartz is not worth a sovereign, especially if it have to be transported to a distance before the gold is extracted. Under such circumstances it is very possible that the extraction of the sovereign's worth of gold may cost thirty shillings. This is why all schemes for dealing profitably with sewage water have failed financially. With dry methods it is different.

When solid matter is washed into a sewer by the help of five gallons of water, the manurial value of the matter is enormously diminished, and five gallons of water have been

unnecessarily dirtied, and will have to be cleansed again before they can take their natural course to the nearest stream.

The great advantage which is claimed for water-carried sewage is that by its means the dwelling is readily rid of disagreeable stuff. It is all very well to pull a handle and shoot poisonous matter into the river where your neighbour bathes or drinks, but the morality of the act is more than questionable. It seems to me very like throwing dead dogs, or other things which cause you annoyance, over your neighbour's wall. Water-carriage is, I believe, the most dangerous, and most expensive, and the most immoral of all methods of dealing with sewage. London began it in 1810. It caused trouble with the cesspools, then trouble with the sewers, then trouble with the Thames. Having got so far into trouble, and having found it, from the fouling of the river, a burden too grievous to be borne, there was no attempt to do what other big cities have done, but a water-carriage on an enormous scale was promulgated, and six millions were spent in carrying London sewage to Barking. This was done some twenty years ago, and we have now over 2000 miles of sewers beneath the London streets. The report of the Commissioners, just issued, tells us that, as a consequence, the fish are gone between Greenwich and Greenhithe, and that in dry weather the sewage floats back to us and as high as Teddington Lock. It is evident that so far from being at the end of our difficulties, that they have increased rather than diminished, and that before long the whole question will have to be considered again.

It is true that the scheme has improved the condition of matters close to London, but this improvement cannot in the nature of things be permanent, and with our rapidly increasing population, and the consequent enormous increase of sewage, it is difficult to see the end.

If after the Great Fire of 1666 it had been recognised that the only way of dealing with sewage is to put it on the soil, how different would our position have been now.

To go with Nature is easy and economical, to fight against her is expensive and dangerous, and must end in failure, for Nature's laws are not to be repealed by Acts of Parliament or local bye-laws.

The frightful waste involved in our present system in London is worth considering. Messrs. Lawes and Gilbert (and there are no higher authorities) estimate that the potential value of the London sewage amounts to £1,273,000 annually. This pearl of great price being diluted with about 60,000,000,000 gallons of water, its actual value is of course very different from its potential value ; but it is undeniable that if dry methods and irrigation for slops could be introduced into London, much of the value of the sewage would be realised, the Thames would be cleared, and we should cease to scatter and disseminate disease germs in the most perfect and thorough manner which ever entered into the mind of man to conceive. The Londoner is not a thrifty being as a rule. Steam machinery has killed the thrift in him. His butter (made from refuse fat) comes by a circuitous route from Holland, and is known in the trade as "Bosch;" much of his "milk" is brought in tins from Switzerland; France supplies most of his eggs; America sends him pork, corn, and tinned foods innumerable. Fresh vegetables come from the south of Europe; fruit from every quarter of the globe; and new potatoes from Scilly and the Channel Islands are to be had in London almost before the home-grown ones have pushed their green tops though the soil. The air of his own district is so foul that nothing will grow; manure is of no use to him, and the legend that fine peaches were once grown in Gower Street is so strange as scarcely to be credible. Free Trade has enabled the Londoner to live, but it certainly has not cultivated in him thrifty habits of thought. It seems tolerably clear that the only thing to save London from gradually drifting into an utterly unmanageable hypertrophy, is to adopt strict rules as to building operations. No house built in the future, on a new site, ought to be allowed to send its solid sewage

matter to the Thames; and every house ought to have a curtilage in proportion to its size, at least sufficient for the decent and ready removal of filth. If the owner of an estate wishes to lay it out for building purposes, he ought to satisfy the authorities that he has arranged for the decent disposal of the filth; and it is only reasonable that the expense of such removal should fall upon the owner of the soil who takes the ground rents, and not upon the public at large, who have no share in his profits.

Until the individual occupier and the individual owner of property is made to feel his moral responsibilities, and, if necessary, is compelled to do his duty towards his neighbours, there can be no permanent improvement in the condition of great cities, and rural and semi-rural districts will drift into the same dangerously over-crowded state which characterises our big towns, and in the size of which we seem to take an unaccountable pride, as though their overgrown dimensions were an undoubted advantage to the public at large.

We have had constant occasion to allude to the power of the earth over dead organic matter. This is seen in its highest degree in the case of the burial of a large number of bodies in one pit, as is done in times of war or pestilence.

In a less degree it is seen in what is known as the dry-earth system of treating excrement. It would be idle to contend that we understand the exact nature of the reaction which takes place between dry earth and excrement. The result of the process is none the less wonderful because we do not know precisely how the change is effected.

If a trowel full of dry earth be thrown over a dejection all offensive odour is stopped. If we examine the earth mixture at the end of a month we find that excrement and everything has been turned to good garden mould, just as the leaves swept into a heap in the autumn are changed to mould by the following summer. If we take this mould and use it a second time, we find that all

has been changed to mould again after the lapse of a month or six weeks. Mould has been used in this way for twelve times in succession without any faltering of the process, and, as far as we know, the power of earth in this direction, even independent of green vegetation, is practically unlimited, and we may infer that earth may be used over and over and over again without offence.

People talk of the difficulties of the dry-earth system, but those who talk thus have no experience of it. If each man needs one and a half pounds of dry earth per diem in order to render his excrement inoffensive and harmless, and if this earth is fit to use at the end of six weeks, then a hundred-weight of earth per head, or a supply for eighty four days, is all that is required. There ought to be no difficulty in procuring a ton of dry earth as the annual supply for a household of twenty persons.

I have had an opportunity of seeing the realisation of a perfectly healthy house. This is the small Union workhouse of Penmaen, in the peninsula of Gower, South Wales. The situation to begin with, is magnificent, though bleak, and exposed in winter to pitiless storms. There is neither drain nor cesspool, and the house is spotlessly clean and entirely without hangings and carpets which harbour dust and filth. There are (on an average) 20 inmates, of whom 9 are children and 4 officials—24 persons in all. The solid filth is mixed with ashes (an ash closet being used), and is moved every day on to the garden, and the whole of the bed-room and cooking slops of the 24 persons are poured (every day) on to a little slip of ground 24 yards long and 4 yards wide, *i.e.*, 96 square yards, or 4 square yards per head. This strip, which I saw during wet weather in February, had no appearance of being overdosed with liquid, and probably would have taken twice or three times as much without difficulty. The crops raised in these workhouse gardens are very large, and the cost of maintenance of the inmates (food and clothing), is 3*s.* 6*d.* per week per head or 9*l.* 2*s.* 0*d.* per annum. The inmates look cheerful and healthy, and the children fat and rosy-

checked. A glance at the returns of death and sickness were interesting. The sickness was limited almost entirely to the old people, and these old people reached great ages. Since 1863 (which was the earliest return accessible) there had not been a single death among the children, the youngest who had died having been 18 years of age ; and in reply to my enquiry as to whether there had been either typhoid, diarrhœa, diphtheria, scarlatina, whooping cough, or measles ; the master informed me that there had been none of these diseases since he had held office (sixteen months), and that he had not heard that any had previously occurred.

And yet, be it remembered, this house stood in a situation exposed to every wind that blows, and in fact was such a house as the majority of mothers would consider a very undesirable winter residence for young children.

The CHAIRMAN said that England was a nation of irregular growth, and the public derived their information, for the most part, through more or less irregular channels. In cases of emergency, the instructions thus sown broadcast by a free press, and by free lectures, among the community, armed that community perhaps better than the official method. The Health Exhibition was, in point of fact, a sample of this irregular mode of teaching, and the handbooks were a sample of teaching of the same kind. When he looked at the list of men who had contributed to these handbooks, and to the quality of the literature, he doubted very much whether any other country in Europe could produce such a set of men capable of writing as good a set of books. The subject of sewage, as Dr. Poore had justly remarked, was a stock subject of conversation in England. It was a stock subject because the public press had sown it broadcast, thus making everybody interested in it. In the lecture which had that day been delivered they had a most noble example of the instructions offered in the irregular manner

which he had just described. Now, as he had said, they were sown broadcast in England, by the public press. Not that the public press was an unadulterated advantage; yet with all its drawbacks there was in it a great residue of good. But at times like the present, when England was threatened with a great calamity, it behoved the press of the country to walk warily, and to seek advice from those competent to give it, before they enunciated opinions which might have an evil effect upon the community. Upon the whole the press acted upon this principle, but still from time to time, they found utterances in the press with which they could not agree. For instance, with regard to the scourge of cholera, with which they were now threatened, he read some time ago that it was not communicable from person to person, but that it was from place to place. That was a great error, and the cause of the error was worth laying bare. At the present time he knew there were physicians who did not believe in the contagiousness of cholera, and for a long time the non-contagiousness of typhoid fever was accepted, and calamity after calamity was the consequence. Physicians were able to point to the hospitals, and they said, so many hundred patients have been treated, and have been nursed in those hospitals, but not a single nurse has succumbed to typhoid fever, and if it was contagious, the nurses could not have escaped. But a wrong conclusion was drawn from that fact. The conclusion which ought to have been drawn was, that the hospital arrangements were excellent, and that the nurses were most careful; for inasmuch as the poison, to which Doctor Poore had so impressively referred, came from the bowels, in a good hospital it was carried away, and no soiled linen was allowed to be scattered abroad, and where all these things were removed, contact with the skin was perfectly innocuous. If they could follow the course of the drains from those hospitals, and see what occurred, then the question would be a very different one. He would emphatically say (and he could not state it with too great emphasis) that he agreed with Dr. Poore in the conclusion

at which he had arrived with regard to the origin of these zymotic diseases. He had lately seen it stated in the public press, that it had not been proved that fevers were due to the parasites, and that parasites only accompanied the disease. It would take him too long to shew how overwhelming was the evidence in favour of the statement of Dr. Poore, that these small organisms were the origin of disease. Such lectures as they had just listened to would go far to prepare the community to cope with cholera whenever it appeared. There was no doubt whatever that the cholera *bacillus* emanated, like typhoid poison, from the bowels, and therefore he would impress upon every one the importance of taking proper steps to meet the enemy at the moment of his appearance, namely, at the moment it reached the body. If the poison was received in disinfectants it would be destroyed. Care ought to be taken not to allow the poison to be sent into the sewer, and thus sown broadcast. England was better able to cope with this disease than other countries, and it could be coped with, if physicians were aided by an intelligent community. He would recommend the public to take time by the forelock, and order disinfectants where likely to be required, and to purchase them in advance, so that they might be ready for application directly the malady appeared. If this were done, the enemy would be killed upon his first appearance. He had spoken of the desirability of the public press giving advice, but where were they to get it? It was a great comfort to his mind that the Local Government Board was ruled by such an experienced person as Dr. Buchanan, and he had not the slightest doubt that this Board would be able to give the best and most trustworthy advice possible.

A vote of thanks having been unanimously passed, Dr. Poore briefly returned thanks for the same.

After the lecture Dr. Poore drew attention to various things exhibited on the table.

1. With a view to diminishing refuse he alluded to the method lately introduced for the home-manufacture

of soap from refuse fat, and Mr. Harvey, the agent for the Greenbank Alkali Works, made a batch of soap from refuse fat from the School of Cookery by the simple process of mixing it (when cool) with a solution of 98 per cent. caustic soda.

2. The various products made by the sanitary authorities at Manchester—guano, soap, oils, candles, concrete, bricks, &c.

3. A sample of dry earth, which had been used ten times in succession for disinfecting excrement, and which presented the characteristics of good garden mould merely.

4. An exceptionally fine sample of onions grown entirely with domestic refuse.

5. A cultivation of bacilli, kindly lent by Mr. Watson Cheyne, the superintendent of the Biological Laboratory in the Exhibition.

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